ST. XAVIER'S COLLEGE (AUTONOMOUS)

PALAYAMKOTTAI - 627 002

(Recognized as "College with Potential for Excellence" by UGC)
(Accredited by NAAC at "A^{++}" Grade with a CGPA of 3.66 out of 4 in IV Cycle)
(Star College Programme by DBT, Govt. of India.)

Affiliated to Manonmaniam Sundaranar University
Tirunelveli

SYLLABUS

Preserve this copy of the syllabus until you complete the course, as it is an important document of your present course of study.

Name _____

B.SC. PHYSICS

(w.e.f. June 2023)

Programme : B.Sc. Physics
Programme Code : UPH

Programme Specific Outcomes:

At the completion of the B.Sc. programme in Physics the Students will be able to

1. Understand and experiment the basic concepts of Properties of Matter and Acoustics, Solar Energy, Space Science and Cosmology, Nuclear Energy, Heat and Thermodynamics, Electricity and Magnetism, Optics and Lasers, Mechanics, Non-conventional Energy Sources, Digital Principles, Electronics, Nuclear Physics, Fiber Optics, Quantum Mechanics and Relativity, Geophysics, Solid State Physics, Instrumentation, Reactor Physics, Nanophysics and Spectroscopy.

2. Develop the skills on scientific programming through Programming with C and C++ and Microprocessor 8085 which will make them choose their career in wide spectrum of areas.

3. Realise their dream on designing electronic appliances by themselves

4. Harness the scientific ideas to reduce pollution by promoting non-conventional or renewable energy resources

5. Gain confidence and move to higher studies

B. Sc. Physics Programme Pattern
(With Effect from June 2023)

Sem	Part	Status	Sub. Code	Title of the Paper	Hrs	Cdt
I	I	Lang	23UGTL11	General Tamil – I	6	3
	I	Lang	23UGHL11	Hindi – I		
	I	Lang	23UGFL11	French - I		
	II	Lang	23UGEL11	Communicative English - I	6	3
	III	Core	23UPHC11	Properties of Matter & Acoustics	6	6
	III	Core	23UPHC12	Properties of Matter & Acoustics Practical	2	2
	III	EC	23UMTE11	Allied – I (Mathematics)	6	5
	IV	SEC1	23UPHN11	Physics for Everyday Life (NME)	2	2
	IV	FC	23UHER11/ 23UHEE11	Foundation Course: Religion: Catholic Doctrine/ Ethics	2	2
				Sub Total	**30**	**23**
II	I	Lang	23UGTL21	General Tamil – II	6	3
	I	Lang	23UGHL21	Hindi – II		
	I	Lang	23UGFL21	French - II		
	II	Lang	23UGEL21	Communicative English - II	6	3
	III	Core	23UPHC21	Heat & Thermodynamics	6	5
	III	Core	23UPHC22	Heat & Thermodynamics Practical	2	3
	III	EC	23UMTE21	Allied – II (Mathematics)	6	5
	IV	SEC2	23UPHN21	Nuclear Energy and its Applications (NME)	2	2
	IV	SEC3	23UHEI21	Integrated Personality Development	2	2
				Sub Total	**30**	**23**
III	I	Lang	23UGTL31	General Tamil – III	6	3
	I	Lang	23UGHL31	Hindi – III		
	I	Lang	23UGFL31	French - III		
	II	Lang	23UGEL31	Communicative English – III	6	3
	III	Core	23UPHC31	Electricity and Magnetism	6	5
	III	Core	23UPHC32	Electricity and Magnetism Practical	2	3
	III	EC	23UCHE31	Allied Chemistry – I	4	3
	III	EC	23UCHE32	Allied Chemistry Practical – I	2	2
	IV	SEC4	23UHEL31	Life coping & Entrepreneurial Skills management	2	2
	IV	SEC5	23UPHN31	Space Science and Cosmology (NME)	2	2
				Sub Total	**30**	**23**
IV	I	Lang	23UGTL41	General Tamil – IV	6	3
	I	Lang	23UGHL41	Hindi – IV		
	I	Lang	23UGFL41	French - IV		
	II	Lang	23UGEL41	Communicative English - IV	6	3
	III	Core	23UPHC41	Optics & Laser	4	4
	III	Core	23UPHC42	Optics & Laser Practical	2	3
	III	EC	23UCHE41	Allied Chemistry – II	3	3
	III	EC	23UCHE42	Allied Chemistry Practical – II	2	2
	IV	SEC6	23UPHN41	Electronics in Daily Life (NME)	2	2
	IV	SEC7	23UPHS42	Discipline Specific - Mechanics	3	2
	IV	EVS	23UEVS41	Environmental Studies	2	2
				Sub Total	**30**	**24**
	III	Core	23UPHC51	Electronics - I	5	4
	III	Core	23UPHC52	Quantum Mechanics & Relativity	5	3

V	III	Core	23UPHC53	Digital Principles	4	3
	III	Core	23UPHC54	Nuclear Physics	4	3
	III	Core	23UPHC55	Electronics – I Practical	2	2
	III	Core	23UPHC56	Digital Principles - Practical	2	2
	III	EC	23UPHE51	Programming with C & C++	4	3
	III	EC	23UPHE52	Programming with C & C++ Practical	2	2
	IV	VE	23UVEH51	Human Rights & Social Analysis	2	2
	IV	Internship	23UPHI51	Internship	-	2
				Sub Total	**30**	**26**
VI	III	Core	23UPHC61	Solid State Physics	4	3
	III	Core	23UPHC62	Nano Physics	4	3
	III	Core	23UPHC63	Electronics - II	4	2
	III	Core	23UPHC64	Electronics - II Practical	2	2
	III	Core	23UPHC65	Instrumentation Practical	2	2
	III	Core	23UPHC66	Project with viva	6	3
	III	EC	23UPHE61	Microprocessor 8085	4	3
	III	EC	23UPHE62	Microprocessor 8085 Practical	2	2
	IV	SEC8	23UPHS61	Professional Competency Skill	-	1
	V	Extension Activitiés		STAND (Student Training and Action for Neighbourhood Development)		
				Sub Total	**30**	**21**
				TOTAL	**180**	**140**
				Additional Compulsory Courses		
I UG		Add-on	23UPHAO1	Domestic Electrical Wiring		**2**
			23UPHAO2	Basic Physics for Beginners		
II UG		Value Added	23UPHVA1	Biomedical Instrumentation		**2**
			23UPHVA2	Basic Electrical and Electronics Circuits		
III UG		ECC	23UPHEC1	Introduction to Solar Energy		**2**
			23UPHEC2	Opto Electronics		
			23UPHEC3	Non-Conventional Energy Sources		
			23UPHEC4	Laser Physics		
			23UPHEC5	Astro Physics		
			23UPHEC6	Renewable Energy Sources		
				TOTAL	**180**	**146**

EC – Elective Course
FC – Foundation Course
VE – Value Education
SEC – Skill Enhancement Course
Discipline Specific – Core and related discipline

பொதுத்தமிழ்-1

Sub. Code : 23UGTL11

பருவம்: 1	தாள்: மொழிப்பாடம்	Hrs: 6	Credits: 3

LEARNING OBJECTIVES: கற்றலின் நோக்கங்கள்

1. முதலாமாண்டு பட்ட வகுப்பு மாணவர்களுக்குத் தமிழ்மொழி இலக்கியங்களை அறிமுகம் செய்தல்.
2. தற்கால இலக்கியப் போக்குகளையும் இலக்கணங்களையும் மாணவர் அறியுமாறு செய்து அவர்களின் படைப்பாற்றலைத் தூண்டுதல்.
3. தமிழ் இலக்கியம் சார்ந்த போட்டித் தேர்வுகளுக்கு ஏற்ப கற்பித்தல் நடைமுறைகளை மேற்கொள்ளுதல்.
4. மொழித்திறன்களை மாணவர்கள் அறிந்துகொள்ள தூண்டுதல்.
5. நவின இலக்கிய வகைமைகளை அறிமுகம் செய்தல்.
6. சமூகச்சிந்தனைகளை உருவாக்க இலக்கியப்பாடுபொருள் காரணமாய் உள்ளது என்பதை அறியச் செய்தல்.

அலகு1: மரபுக்கவிதை

1. பெ. சுந்தரனார் - தமிழ்த் தெய்வவணக்கம்
2. பாரதிதாசன் - சிறுத்தையே வெளியே வா
3. கவிமணி - புத்தரும் சிறுவனும்
4. முடியரசன் - மொழி உணர்ச்சி
5. கண்ணதாசன் - ஆட்டனத்தி ஆதிமந்தி (ஆதிமந்தி புலம்பல்)
6. சுரதா - துறைமுகம் (வினாத்தாள்)
7. தமிழ் ஒளி - கடல்

அலகு2: புதுக்கவிதை

1. அப்துல் ரகுமான் - வீட்டுக்கொரு மரம் வளர்ப்போம்
2. ஈரோடு தமிழன்பன் - சென்ரியூ கவிதைகள் (ஏதேனும் ஐந்து கவிதைகள்)
3. வைரமுத்து - பிற்சேர்க்கை
4. மு.மேத்தா - வாழைமரத்தின் சபதம்
5. அறிவுமதி - வள்ளுவம் பத்து
6. நா. முத்துக்குமார் - ஆனந்த யாழை மீட்டுகிறாய்
7. சுகிர்தராணி - சபிக்கப்பட்ட முத்தம்
8. இளம்பிறை - நீ எழுத மறுக்கும் எனது அழகு

அலகு3: சிறுகதைகள்

1. வாய்ச்சொற்கள் - ஜெயகாந்தன் (மாலை மயக்கம் தொகுப்பு)
2. கடிதம் - புதுமைப்பித்தன்
3. கரு - உமா மகேஸ்வரி
4. முள்முடி - தி. ஜானகிராமன்
5. சிதறல்கள் - விழி. பா. இதயவேந்தன்
6. காகிதஉறவு - சு. சமுத்திரம்
7. வீட்டின் மூலையில் சமையலறை- அம்பை
8. (மொழிப்பெயர்ப்புக் கதை) நாய்க்காரச் சீமாட்டி – ஒரு குறும்புக்காரச் சிறுவன்

அலகு4: பாடம் சார்ந்த இலக்கிய வரலாறு

அலகு5 : மொழித்திறன் போட்டித் தேர்வு

1. பொருள் பொதிந்த சொற்றொடர் அமைத்தல்
2. ஓர் எழுத்து ஒரு மொழி
3. வேற்றுமை உருபுகள்
4. திணை, பால், எண், இடம்
5. கலைச்சொல்லாக்கம், மொழிபெயர்ப்பு

COURSE OUTCOMES: பயன்கள்

இப்பாடங்களைக் கற்பதால் மாணவர் பின்வரும் பயன்களைப் பெறுவர்.

CO1– பாரதியார் காலந்தொட்டு தற்காலப் புதுக்கவிதைகள் வரை கவிதையிலக்கியம் அறிமுகப்படுத்தப்படுவதால் படைப்பாற்றல் திறன் பெறுதல். (K1,K2)

CO2– புதுக்கவிதை வரலாற்றினைஅறிந்துகொள்வர். (K2)

CO3- இக்கால இலக்கிய வகையினைக் கற்பதன் மூலம் படைப்பாக்கத் திறனைப் பெறுதல். (K4)

CO4– மொழி அறிவோடு சிந்தனைத் திறன் அதிகரித்தல். (K3)

CO5– தமிழ்மொழியைப் பிழையின்றி எழுதவும், புதிய கலைச் சொற்களை

உருவாக்கவும் அறிந்துகொள்வர். (K4)

CO6– காலந்தோறும் சமூகச் சிந்தனைகள் மாறுவதை இலக்கிய வரலாற்றின்

மூலம் அறிந்து கொள்ளுதல். (K6)

TEXT BOOKS (பாடநூல்கள்)

1. தமிழ்த்துறை வெளியீடு - தூய சவேரியார் தன்னாட்சிக் கல்லூரி, பாளையங்கோட்டை.
2. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு– எ.ஃ.ப். பாக்கியமேரி

REFERENCE BOOKS (பார்வை நூல்கள்)

- தமிழ் இலக்கிய வரலாறு - சிற்பி. பாலசுப்பிரமணியன்
- புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு – தமிழண்ணல்
- தமிழ் இலக்கிய வரலாறு – சேதுராமன்

WEB SOURCES (இணையதளங்கள்)

- Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org>
- Tamil virtual University Library- www.tamilvu.org/ library http://www.virtualvu.org/library
- Project Madurai - www.projectmadurai.org.
- Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
- Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
- Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com
- Tamil Books on line- books.tamil cube.com
- Catalogue of the Tamil books in the Library of British Congress archive.org
- Tamil novels on line - books.tamilcube.com

பொதுத் தமிழ் - 2

Sub. Code : 23UGTL21

பருவம்: 2	தாள்:மொழிப்பாடம்	Hrs: 6	Credits: 3

LEARNING OBJECTIVES: கற்றலின் நோக்கங்கள்

1. சமய இலக்கியங்களையும் சிற்றிலக்கியங்களையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
2. மொழித்திறனையும் சிறுகதை இலக்கிய வடிவத்தையும் மாணவர்களுக்கு உணர்த்துதல்.
3. தமிழ் இலக்கிய வரிசையில் சமய இலக்கியங்களின் முக்கியத்துவத்தை உணர்த்துதல்.
4. தமிழ் இலக்கிய வரிசையில் சிற்றிலக்கியங்களின் முக்கியத்துவத்தை அறிமுகம் செய்தல்.
5. தமிழ் இலக்கிய வளமைக்குப் பல்சமயங்கள் ஆற்றிய பங்கினை உணரச் செய்தல்.
6. சமய, சிற்றிலக்கியங்களின் இடத்தைத் தமிழ் இலக்கிய வரலாற்றின் வழி அறியச் செய்தல்.

அலகு 1:

- திருநாவுக்கரசர் - தேவாரம் - நாமார்க்கும் குடியல்லோம் எனத் தொடங்கும் பதிகம் (10 பாடல்கள்)
- ஆண்டாள் - திருப்பாவை (முதல் 20 பாசுரம்)

அலகு 2 :

- வள்ளலார் - அருள் விளக்கமாலை (முதல் 10 பாடல்கள்)
- எச்.ஏ.கிருட்டிணப்பிள்ளை - இரட்சணியமனோகரம் - பால்ய பிராத்தனை
- குணங்குடி மஸ்தான் சாகிபு – பராபரக்கண்ணி (முதல் 10 கண்ணி)

அலகு 3:

- தமிழ் விடுதூது (முதல் 20 கண்ணி)
- திருக்குற்றாலக் குறவஞ்சி – குறத்தி மலைவளம் கூறுதல்
- முக்கூடற்பள்ளு – நாட்டு வளம்

அலகு 4: பாடம் தழுவிய இலக்கிய வரலாறு

(பல்லவர் காலம், நாயக்கர் காலம்)

அலகு 5 : மொழித்திறன் - போட்டித் தேர்வுத்திறன்

1. தொடர் வகைகள்
2. மரபுத்தொடர், பழமொழிகள்
3. பிறமொழிச் சொற்களைக் களைதல்
4. வழுச்சொற்கள் நீக்குதல்
5. இலக்கணக் குறிப்பு அறிதல்.

COURSE OUTCOMES - பயன்கள்

CO1– பக்தி இலக்கியங்களைக் கற்பதன் மூலம் பக்தி நெறியினையும், சமய நல்லிணக்கத்தையும் தெரிந்து பின்பற்றுவர். (K1,K2)

CO2– சிற்றிலக்கியங்களின் வழி இலக்கியச் சுவையினையும் பண்பாட்டு அறிவினையும் பெறுவர். (K2)

CO3– பட்டப்படிப்பினைப் படிக்கும்போதே பெரும்பான்மையான தமிழ் இலக்கியங்கள் குறித்த அறிவினைப் பெறுவர். (K4)

CO4– தமிழ்ச் சமூகப் பண்பாட்டு வரலாற்றினை இலக்கியங்கள் வாயிலாக அறிவர். (K3)

CO5– போட்டித் தேர்வுகளில் வெற்றிப் பெறுவதற்குத் தமிழ்ப்பாடத்தினை பயன் கொள்ளும் வகையில் ஏற்ற பயிற்சி பெறுவர். (K4)

CO6– பல்சமய இலக்கியங்களை அறிவதன் மூலம் பல்சமய உரையாடல்களின் முக்கியத்துவத்தை அறிவர். (K3)

TEXT BOOKS (பாட நூல்கள்)

1. தமிழ்த்துறை வெளியீடு, தூய சவேரியார் தன்னாட்சிக் கல்லூரி, பாளையங்கோட்டை.
2. வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு– எ.ஃ.ப். பாக்கியமேரி

REFERENCE BOOKS (பார்வை நூல்கள்)

- தமிழ் இலக்கிய வரலாறு - சிற்பி. பாலசுப்பிரமணியன்
- புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு – தமிழண்ணல்
- தமிழ் இலக்கிய வரலாறு – சி.சேதுராமன்

WEB SOURCES (இணையதளங்கள்)

- Tamil Heritage Foundation- www.tamilheritage.org <http://www.tamilheritage.org>
- Tamil virtual University Library- www.tamilvu.org/ library http://www.virtualvu.org/library
- Project Madurai - www.projectmadurai.org.
- Chennai Library- www.chennailibrary.com <http://www.chennailibrary.com>.
- Tamil Universal Digital Library- www.ulib.prg <http://www.ulib.prg>.
- Tamil E-Books Downloads- tamilebooksdownloads. blogspot.com
- Tamil Books on line- books.tamil cube.com
- Catalogue of the Tamil books in the Library of British Congress archive.org
- Tamil novels on line - books.tamilcube.com

பொதுத் தமிழ் - 3
Sub Code: 23UGTL31

பருவம்: 3	தாள்: மொழிப்பாடம்	Hrs: 6	Credits: 3

Learning objectives: கற்றலின் நோக்கங்கள்

1. காலந்தோறும் எழுந்த காப்பியங்களின் போக்கையும், புதினத்தின் இலக்கிய வடிவத்தையும் மாணவர்கள் உணருமாறு செய்தல்
2. காப்பியம், புதினம், ஆகிய படைப்பியல் வகைகளைப் பற்றிய பரந்து பட்டபுலமையைப் பெருக்குதல்.
3. தமிழ் இலக்கியங்களின் உள்ளடக்கம், வெளியீட்டுநெறி, படைப்பியல் கொள்கை ஆகியவற்றை அறியச் செய்தல்.
4. இலக்கியக் கொள்கைகளின் அடிப்படையில் இலக்கியங்களைத் திறனாய்வுச் செய்யப் பயிற்சி அளித்தல்.
5. படைப்புத் துறையிலும் ஊடகத் துறையிலும் கல்விப் புலத்திலும் அயல்நாடுகளிலும் வேலைவாய்ப்பினைப் பெறுதற்குத் துணைசெய்தல்.
6. மதிப்புரை, திறனாய்வு அறிமுகப்படுத்துவதன் மூலம் சிறந்த திறனாய்வுகளை அடையாளம் காணுதல்

அலகு: 1

சிலப்பதிகாரம ˙- வழக்குரைகாதை, மணிமேகலை – ஆதிரை பிச்சையிட்ட காதை, சீவகசிந்தாமணி - பூமகள் இலம்பகம், வளையாபதி

அலகு: 2

பெரியபுராணம் - பூசலார் புராணம், கம்பராமாயணம் - மந்தரை சூழ்ச்சிப் படலம், வில்லிபாரதம் - மற்போர் சருக்கம், சீறாப்புராணம் - புலி வசனித்த படலம்.

அலகு: 3

வஞ்சிமாநகரம் வரலாற்றுப் புதினம் - நா.பார்த்தசாரதி

அலகு: 4

பாடம் தழுவிய இலக்கிய வரலாறு

அலகு: 5

மொழித்திறன்

1. நூல் மதிப்புரை
2. திறனாய்வுசெய்தல்
3. கடிதம் வரைதல்
4. விண்ணப்பம் எழுதுதல்

Course outcomes: பயன்கள்

CO1 – காப்பியங்களின் வழி வாழ்வியல் சிந்தனையைப் பெறுதல். (K1,K2)

CO2 – காப்பியங்கள் அறிமுகப் படுத்தப்படுவதால் தமிழ் மொழியின் உயர்வையும், சிறப்பையும் உணர்தல். (K2)

CO3 – தமிழ் புதினங்கள் வழி சமகாலப் படைப்புகளின் வாழ்வியல் சிந்தனைகளைஅறிதல் (K4)

CO4 – நாவல் இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனை ஆற்றல், படைப்பாற்றல், கற்பனைத் திறன் வளர்தல் (K3)

CO5 – தமிழ் இலக்கியம் சார்ந்தபோட்டித் தேர்வுகளை எதிர்கொள்ளும் ஆற்றல் பெறுதல் (K4)

CO6 - கடிதம், விண்ணப்பம் எழுதும் முறைகளைஅறிதல் (K6)

பாடநூல்கள் :

தமிழ்த்துறை வெளியீடு

பார்வை நூல்கள்

1. **தமிழ் இலக்கியவரலாறு- சிற்பிபாலசுப்பிரமணியன்**

இணையதளம்

1. Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage. Org>.
2. Tamil Virtual University Library – www.tamilvw.org/libraryhttp://www. virtualvu.org/library
3. Project Madurai – www.projectmadurai.org
4. Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com
5. Tamil Universal Library- www.ulib.prg<http://www.ulib.pig7
6. Tamil E-books downloads – tamilbooksdownloads.blogspot.com
7. Tamil Books online – books.tamilcube.com
8. Catalogue of the Tamil Books in the library of British congress archive.org
9. Tamil novels.online – books.tamil.cube.com

பொதுத்தமிழ் - 4
Sub Code: 23UGTL41

பருவம்: 4	தாள்: மொழிப்பாடம்	Hrs: 6	Credits: 3

Learning objectives: கற்றலின் நோக்கங்கள்

1. இலக்கியங்களின் சிறப்பினை உணர்த்துதல்
2. சங்க இலக்கியத்தின் மும் வாழிவயல நெறிகள உணர்தல்
3. தமிழ் இலக்கியங்களின் உள்ளடக்கம், வெளியீட்டுநெறி, படைப்பியல் கொள்கை ஆகியவற்றை அறியச் செய்தல்.
4. அகத்திணை, புறத்திணை இலக்கணங்களை மாணவர்கள் அறியச் செய்தல்
5. மொழிபெயர்ப்புத் திறனை வளர்த்தல்
6. நாடக இலக்கியங்களின் அமைப்பு முறையை அறிதல்

அலகு: 1

நற்றிணை 10, 14, 16, குறுந்தொகை - 16, 17, 19, 20, 25, 29, 38, 44, கலித்தொகை - 38, 51, அகநானூறு - 15, 33, 55, புறநானூறு - 37, 86, 112, பரிபாடல் - 55

அலகு: 2

நெடுநல்வாடை- நக்கீரர்

அலகு: 3

சபாபதிநாடகம் - பம்மல் சம்பந்த முதலியார்

அலகு: 4

பாடம் தழுவிய இலக்கியவரலாறு

அலகு: 5

மொழித்திறன்

1. மொழிபெயர்ப்புகலைச்சொற்கள்
2. கொடுக்கப்பட்டுள்ள ஆங்கிலப் பகுதியைத் தமிழில் மொழிபெயர்த்தல்
3. அலுவலகக் கடிதம்- தமிழில் மொழிபெயர்த்தல்

Course outcomes: பயன்கள்

CO1 – சங்க இலக்கியங்களில் காணப்படும் வாழ்வியல் சிந்தனைகளை அறிதல (K1,K2)
CO2 – தமிழின் தொன்மையையும் செம்மொழித் தன்மையையும் உணர்தல் (K2)
CO3 – நாடக இலக்கியம் மூலம் நடிப்பாற்றலையும் கலைத்தன்மையையும வளர்த்தல (K4)
CO4 – நாடக இலக்கியம் அறிமுகப்படுத்தப்படுவதால் சிந்தனை ஆற்றல், படைப்பாற்றல், கற்பனைத் திறன் வளர்தல் (K4)
CO5 – தமிழிலிருந்து அலுவலகக் கடிதங்களை மொழிபெயர்க்கும் அறிவைபபெறுதல் (K3)
CO6 - மோழி அறிவோடு வேலைவாய்ப்பினையும் பெறுதல். (K4)

பாடநூல்கள் :

தமிழ்த்துறை வெளியீடு

பார்வை நூல்கள்

2. தமிழ் இலக்கிய வரலாறு- சிற்பிபாலசுப்பிரமணியன்

இணையதளம்:

1. Tamil Heritage Foundation – www.tamilheritage.org<http://www.tamilheritage. Org>.
2. Tamil Virtual University Library – www.tamilvw.org/libraryhttp://www. virtualvu.org/library
3. Project Madurai – www.projectmadurai.org
4. Chennai Library – www.chennailibrary.com<http://www.chennailibrary.com
5. Tamil Universal Library- www.ulib.prg<http://www.ulib.pig7
6. Tamil E-books downloads – tamilbooksdownloads.blogspot.com
7. Tamil Books online – books.tamilcube.com
8. Catalogue of the Tamil Books in the library of British congress archive.org
9. Tamil novels.online – books.tamil.cube.com

DEPARTMENT OF ENGLISH

UG – PART II - GENERAL ENGLISH

(The Seven-Tier Pattern recommended by UGC Curriculum Development Centre and Identified as Best Practice by NAAC)

	Stream A (For learners of high entry level proficiency)	**Stream B** (For learners of average entry level proficiency)	**Stream C** (For learners of low entry level proficiency)
Courses in Semester I	**IV 23UGEL14**	**III 23UGEL13**	**I 23UGEL11**
Courses in Semester II	**V 23UGEL25**	**IV 23UGEL24**	**II 23UGEL22**
Courses in Semester III	**VI 23UGEL36**	**V 23UGEL35**	**III 23UGEL33**
Courses in Semester IV	**VII 23UGEL47**	**VI 23UGEL46**	**IV 23UGEL44**

GENERAL COURSE OUTCOMES

CO1 Acquire the four language skills (Listening, Speaking, Reading and Writing)

CO2 Develop the skill of independent reading and interpreting of graded texts

CO3 Expand and consolidate active and passive vocabulary

CO4 Acquire the skills needed to participate in a conversation that builds knowledge collaboratively

CO5 Acquire a clear understanding of English Grammar to facilitate accuracy of communication

CO6 Develop the skills of formal written communication to be used in academic and career related contexts

TEXTS

Course I - *Spotlight I*

Course II - *Spotlight II*

Course III - *Spotlight III*

Course IV - *Spotlight IV*

Course V - *Spotlight V*

Course VI - *Spotlight VI*

Course VII - William Shakespeare's *Julius Caesar* &
Charles Dickens' *Oliver Twist*

All Courses - *Active English Grammar and Composition* by the Board of Editors

EXTERNAL EXAMINATION

- External Examination has two components.
  1) Written Examination and 2) Viva Voce
- A three-hour written examination will be conducted for 100 marks for all General English papers and the scores will be converted to 40 marks, with a pass minimum of 16 marks
- At the end of every semester, **Spoken English Viva Voce** will be conducted for all the students for 100 marks (four components) and the scores will be converted to 10 marks, with a required pass minimum of 4 marks
- To pass in any General English paper, a student must secure the pass minimum of 40 out of 100

Distribution of marks:	**Written Exam** (100 marks)		Converted to 40 marks
	Viva voce	(100 marks)	Converted to 10 marks
	TOTAL	**(40+10)**	**50 marks**

INTERNAL ASSESSMENT

- Two Internal Examinations shall be conducted for 50 marks each along with the Continuous Internal Assessments for the Core and Allied courses.
- The internal assessment for the courses may include assignments, seminars, projects, tests, viva (any oral presentation), communication activities etc., focusing on skill development or / and the course content

GENERAL ENGLISH

COURSE – I

Hours: 6	**Course Code: 23UGEL11**	**Credits: 3**

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading and writing
LO2 To make the learners learn the basic elements of grammar
LO3 To enable them to involve in basic communicative activities
LO4 To develop basic vocabulary
LO5 To help the learners comprehend and respond in English
LO6 To build confidence in using English to communicate

UNIT	**TOPICS**	
I	**POETRY** Maya Angelou Hilaire Belloc	 "Poor Girl" "The Justice of Peace"
II	**PROSE** A. P. J. Abdul Kalam Madhavan Kutty	 "My Early Days" "I Won't Let Him Go!"
III	**SHORT STORIES** Oscar Wilde Mulk Raj Anand	 "The Selfish Giant" "The Lost Child"
IV	**LANGUAGE COMPETENCY** 1. Use of Verbs: Verb Grid (Positive, Negative & Question), Regular Verbs, Irregular Verbs & Modals 2. Tenses: Active Voice Tenses & Passive Voice Tenses 3. Use of Nouns: Forms of Personal Pronouns, Use of Nouns as Subject, Object, Complement and Object of the Preposition 4. Sentence Patterns: SV, SVO, SVC, SVA, SVOA, SVIODO 5. Punctuation and Capitalisation 6. Reading Comprehension (5 Anecdotes and 5 Wisdom Stories)	
V	**SPOKEN ENGLISH** 1. Reading Aloud (From the text) 2. Introducing oneself 3. Describing a place (With hints) 4. Describing a picture(With hints)	

COURSE OUTCOMES

CO1 Use grammatical structures in meaningful constructions
CO2 Use oral communication for day-to-day activities
CO3 Use simple sentences for oral and written communication
CO4 Use punctuation and capitalisation accurately
CO5 Comprehend what they listen to, and respond to it at the primary level
CO6 Read and appreciate simple stories and anecdotes

TEXTBOOKS

1. Board of Editors. *Spotlight I.* India: Ponnsai Publishers & Distributors, 2015.
2. *Oxford Elementary Learner's Dictionary*. Ed. Angela Crawley. Phonetics Ed. Michael Ashby. United Kingdom: Oxford University Press, 2021.
3. Board of Editors. *Active English Grammar and Composition.* India: Trinity Press, 2022.

REFERENCE

- Bhatnagar, R. P. ,*English for Competitive Examinations,* India: Trinity Press, 2017.
- Joseph K. V. , *A Textbook of English Grammar & Usage,* India: McGraw Hill Education 2015.
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	3 Short essays (200 words each) out of 6 from Units I, II & III (3X10)	30
II	5 Match the following from Units I, II & III	05
III	5 Stating True or False from Units I, II & III	05
IV	Verb Grid (Positive, Negative & Question)	20
V	Tense Grid (Active & Passive)	10
VI	Noun as subject, object, complement & object of the preposition	10
VII	Sentence pattern	10
VIII	Punctuation & Capitalization	05
IX	Reading comprehension	05
	Total	**100**

GENERAL ENGLISH

COURSE – II

Hours: 6	**Course Code: 23UGEL22**	**Credits: 3**

LEARNING OUTCOMES

LO1 To provide an ambience to acquire the basic language skills, listening, speaking, reading and writing
LO2 To make the learners frame questions and answers
LO3 To enable them to involve in basic communicative activities
LO4 To develop a comprehensible use of adjectives and adverbs
LO5 To help the learners comprehend and respond in English
LO6 To develop oral communication for day-to-day activities

UNIT	**TOPICS**	
I	**POETRY** Rabindranath Tagore Gieve Patel	 "Leave this Chanting and Singing" " On Killing a Tree"
II	**PROSE** Leslie W. Leavitt Sister Nivedita	 "Mahatma Gandhi" "The Judgement Seat of Vikramaditya"
III	**SHORT STORIES** O. Henry Stephen Leacock	 "After Twenty Years" "With the Photographer"
IV	**LANGUAGE COMPETENCY** 1. Use of Adjectives 2. Use of Adverbs 3. Use of Conditional 'If' (Probable & Improbable Conditions) 4. Use of 'who', 'which', 'where' & 'that' in combining sentences 5. Framing questions – 'Wh -' &'Yes' / 'No' Questions 6. Prefixes and Suffixes 7. Developing Hints into a Paragraph	
V	**SPOKEN ENGLISH** 1. Reading Aloud (from the Prescribed Text) 2. Introducing Others 3. Describing a Personality (from Hints) 4. Narrating a Story(from Hints)	

COURSE OUTCOMES

CO1 Use grammatical structures in meaningful contexts
CO2 Use oral communication for day-to-day activities
CO3 Use simple sentences for oral and written communication
CO4 Use enhanced vocabulary
CO5 Comprehend and respond to what they listen to at the secondary level
CO6 Read and appreciate simple pieces of fiction and non-fiction

TEXTBOOKS

1. Board of Editors. *Spotlight II*.India: Ponnsai Publishers & Distributors, 2015.

2. *Oxford Elementary Learner's Dictionary*. Ed. Angela Crawley. Phonetics Ed. Michael Ashby.United Kingdom: Oxford University Press, 2021.

3. Board of Editors. *Active English Grammar and Composition.* India:Trinity Press, 2022.

REFERENCE

- Bhatnagar, R. P., *English for Competitive Examinations.* India: Trinity Press, 2017.
- Joseph K. V. *A Textbook of English Grammar & Usage,* India:McGraw Hill Education, 2015.
- Sinha, R. P. *Current English Grammar and Usage with Composition.* India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	3 Short Essays from Unit I, II and III	30
II	5 True or False (Units I, II and III)	05
III	5 Match the Following (Unit I, II and III)	05
IV	Adding appropriate adjectives	10
V	Adding appropriate adverbs	10
VI	Framing Probable & Improbable Conditional Sentences	10
VII	Combining Sentences with 'who', 'where', 'which' &'that'	10
VIII	Framing 'Wh' &'Yes/No' Qns.	10
IX	Prefixes & Suffixes	05
X	Developing Hints to a Paragraph (100 words)	05
	Total	**100**

GENERAL ENGLISH

COURSE - III

Hours: 6	**Course Code: 23UGEL13, 23UGEL 33**	**Credits: 3**

LEARNING OUTCOMES

LO1 To involve the learners in reading and interpreting English in poetry and prose (Fiction and Non-fiction)

LO2 To enable learners to write about prescribed literature

LO3 To help learners develop vocabulary register

LO4 To help learners learn the appropriate use of articles, prepositions and adverbs

LO5 To facilitate in learners, the ability to create a narration based on hints

LO6 To build confidence in the learners to speak English for specific purposes

UNIT	**TOPICS**	
I	**POETRY** William Shakespeare P. B. Shelley Oliver Goldsmith	"All the World's a Stage" "Ozymandias" "The Village Schoolmaster"
II	**SHORT STORIES** A. J. Cronin Stephen Leacock Ernest Hemingway	"Two Gentlemen of Verona" "The Conjuror's Revenge" "A Day's Wait"
III	**PROSE & SHORT STORIES** C. L. N. Prakash O. Henry Natsume Soseki	"Rethink Your Thinking" "The Gift of the Magi" "I am a Cat"
IV	**LANGUAGE COMPETENCY** 1. Homonyms, Homophones, Homographs 2. Articles 3. Prepositions 4. Adverbs 5. Constructing a story using hints	
V	**SPOKEN ENGLISH** 1. Reading aloud 3. Describing a picture 2. Describing a process 4. Personal Conversation (Habits, Hobbies, Future Plan)	

COURSE OUTCOMES

CO1 Read and understand English in poetry and prose (Fiction and Non-Fiction)

CO2 Write coherent essays about prescribed literature

CO3 Use words from acquired vocabulary register

CO4 Use articles, prepositions and adverbs appropriately

CO5 Create a narration from hints

CO6 Speak English confidently in a descriptive as well as expository style

TEXTBOOKS

1. Board of Editors. *Spotlight III,* India: Ponnsai Publishers & Distributors, 2015.

2. Board of Editors. *Active English Grammar and Composition.* India: Trinity Press, 2022.

REFERENCE

- Bhatnagar, R. P. *English for Competitive Examinations.* India: Trinity Press, 2017.
- Joseph. K. V, *A Textbook of English Grammar & Usage,* India:McGraw Hill Education, *2015*
- Sinha, R. P. *Current English Grammar and Usage with Composition.* India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	1 Short Essay (200 words) out of 2 from Unit I	10
II	1 Essay (300 words) out of 2 from Unit II	15
III	1 Essay (300 words) out of 2 from Unit III	15
IV	5 passages with 2 Qns. each (from Units I,II &III)	10
V	Homonyms, Homophones, Homographs	10
VI	Articles	10
VII	Prepositions	10
VIII	Adverbs	10
IX	Constructing a story	10
	Total	**100**

GENERAL ENGLISH

COURSE - IV

Hours: 6	**Course Code: 23UGEL14, 23UGEL24, 23UGEL44**	**Credits: 3**

LEARNING OUTCOMES

LO1 To make learners read and understand intermediate level poetry and prose

LO2 To encourage learners to continue building a vocabulary register as the students interpret, speak and write about prescribed literature

LO3 To enable learners fashion sentences to make paragraphs with unity of sense and structure

LO4 To enable learners plan, organise ideas and write an essay

LO5 To help learners learn the different types of letter, their structures and the use of appropriate language

LO6 To make learners use grammatical structures in meaningful constructions

UNIT	**TOPICS**	
I	**POETRY** William Shakespeare John Milton Lewis Carroll Nissim Ezekiel	 "Shall I Compare Thee" "On His Blindness" "The Walrus and the Carpenter" "The Professor"
II	**PROSE** Amitav Ghosh Desmond Morris Mark McCormack	 "The Town by the Sea" "A Little Bit of What You Fancy" "To Know When to Say It's None of Your Business"
III	**SHORT STORIES & DRAMA** Aldous Huxley Oscar Wilde Fritz Karinthy	 "The Portrait" "The Happy Prince" "The Refund"
IV	**LANGUAGE COMPETENCY** 1. Tenses (with Verb Grid) 2. Concord 3. Describing a thing / a place / an event 4. Spotting Errors (Tenses and Concord) 5. Letter Writing (Personal & Official)	
V	**SPOKEN ENGLISH** 1. Reading Aloud 2. Issue based conversation 2. Speaking about prescribed literature 4. Speaking on a given topic	

COURSE OUTCOMES

CO1 Read, interpret and analyse intermediate level of English in poetry, prose and fiction

CO2 Write coherent essays on prescribed literature

CO3 Use the various tense forms accurately with proper subject - verb agreement
CO4 Write descriptive paragraphs with unity of sense
CO5 Identify common errors in the usage of Tenses and Concord
CO6 Speak English fluently with confidence in an expository as well as analytical style

TEXTBOOKS

1. Board of Editors. *Spotlight IV*. India: Ponnsai Publishers & Distributors, 2015.
2. Board of Editors. *Active English Grammar and Composition.* India: Trinity Press, 2022.

REFERENCE

- Bhatnagar, R. P. *English for Competitive Examinations.* India: Trinity Press, 2017.
- Joseph K. V. *A Textbook of English Grammar & Usage,* India:McGraw Hill Education, *2015*
- Sinha, R. P. *Current English Grammar and Usage with Composition*, India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	1 Short Essay (200 words) out of 2 from Unit I	10
II	1 Essay (300 words) out of 2 from Unit II	15
III	1 Essay (300 words) out of 2 from Unit III	15
IV	5 passages with 2 Qns. each (from Units I, II & III)	10
V	Tenses	10
VI	Concord	10
VII	Describing a thing / a place / an event	10
VIII	Spotting Errors	10
IX	Letter Writing	10
	Total	**100**

GENERAL ENGLISH

COURSE – V

Hours: 6	Course Code: 23UGEL25, 23UGEL35	Credits: 3

LEARNING OUTCOMES

LO1 To introduce learners to intermediate level of English through prescribed d literature

LO2 To make learners read, interpret and write about prescribed pieces of literature

LO3 To make learners learn complex language structures and appropriate use of conjunctions

LO4 To help learners become familiar with the accurate use of language with an awareness of common errors in language use

LO5 To make learners understand the logical sequence of ideas within a paragraph

LO6 To make learners speak English fluently with confidence and accuracy for specific purposes

UNIT	TOPICS	
I	**POETRY** William Wordsworth Robert Frost Mina Assadi H.W. Longfellow Philip Larkin	 "The Solitary Reaper" "The Road Not Taken" "A Ring to Me Is Bondage" "A Slave's Dream" "Next Please"
II	**PROSE, DRAMA AND SHORT STORY**	
	Dr. Radhakrishnan Collins & Lapiere Oscar Wilde Somerset Maugham A. A. Milne	"Humanities Vs Sciences" "The Second Crucifixion" "The Model Millionaire" "The Ant and the Grasshopper" "The Boy Comes Home"
III	**LANGUAGE COMPETENCY (Grammar & Vocabulary)** 1. Words often confused 2. Synonyms and Antonyms 3. Synthesis and Transformation of Sentences (Simple, Compound & Complex) 4. Conjunctions 5. Active - Passive Voice	
IV	**LANGUAGE COMPETENCY (Composition)** 1. Expansion of Ideas / Proverbs 2. Sentence Arrangement 3. Dialogue Writing	
V	**SPOKEN ENGLISH** 1. Reading and Interpreting 2. Turncoat 3. Expand a Proverb 4. Issue Based Conversation	

COURSE OUTCOMES

CO1 Read, interpret and analyse poetic English to understand open possibility of inferences

CO2 Write logically planned essays to address specific questions concerning prescribed literature

CO3 Understand the forms and structural differences in different types of sentences and their specific purposes

CO4 Use complex language structures with appropriate conjunctions

CO5 Use vocabulary actively with an awareness of homonyms, homophones, synonyms and antonyms

CO6 Use Spoken English fluently with confidence and accuracy for specific purposes such as analytical, argumentative and expository talks

TEXT BOOKS

1. Board of Editors. *Spotlight V,* India:Ponnsai Publishers & Distributors, 2015.
2. Board of Editors. *Active English Grammar and Composition.* India:Trinity Press, 2022.

REFERENCE

- Bhatnagar, R. P. *English for Competitive Examinations*, India: Trinity Press, 2017.
- Joseph K. V. *A Textbook of English Grammar & Usage,* India: McGraw Hill Education*, 2015*
- Sinha, R. P. *Current English Grammar and Usage with Composition*, India: Oxford University Press, 2018

S. No.	QUESTION PATTERN	Marks
I	1 Short Essay (200 words) out of 2 from Unit I	10
II	1 Essay (300 words) out of 2 from Unit II	15
III	5 passages with 2 Qns. each (from Units I, II & III)	10
IV	Vocabulary	15
V	Synthesis of sentences	10
VI	Transformation of sentences	05
VII	Active - Passive Voice	10
VIII	Conjunction	05
IX	Expansion of Ideas / Proverbs (2x5=10)	10
X	Sentence Arrangement	05
XI	Dialogue Writing	05
	Total	**100**

GENERAL ENGLISH

COURSE - VI

Hours: 6	**Course Code: 23UGEL36, 23UGEL46**	**Credits: 3**

LEARNING OUTCOMES

LO1 To introduce learners to advanced level of poetic English through representative pieces, to make them understand oblique use of language

LO2 To make them read and understand modern English prose through samples of biography, autobiography, short story and one act play

LO3 To familiarise them with advanced language structures and the use of idioms and phrasal verbs

LO4 To make them understand and use different degrees for comparison and use language for reporting speech

LO5 To acquaint them with the skills of expanding or developing, and condensing ideas

LO6 To make them speak English fluently and accurately for specific purposes

UNIT	**TOPICS**	
I	**POETRY** Edwin Arnold Sylvia Plath John Keats John Donne Maya Angelou	 "Siddhartha" "The Mirror" "La Belle Dame Sans Merci" "Death Be Not Proud" "I Know Why the Caged Bird Sings"
II	**PROSE, SHORT STORY & DRAMA** Anne Frank C.P. Snow Chinua Achebe Hugh Chesterton	 "The Diary of a Young Girl" "Hardy and Ramanujan" "Marriage is a Private Affair" "The Pie and the Tart"
III	**LANGUAGE COMPETENCY (Grammar and Vocabulary)** 1. Degrees of Comparison 2. Direct- Indirect Speech 3. Cloze Test. 4. Idioms and Phrasal verbs 5. Spotting Errors	
IV	**LANGUAGE COMPETENCY (Composition)** 1. Précis Writing 2. Essay Writing	
V	**SPOKEN ENGLISH** 1. Reading and Interpretation 2. Issue Based Conversation 3. Public Speaking on subject topic 4. Extempore	

COURSE OUTCOMES

CO1 Read and interpret the oblique language of poetry and write appreciative essays on the prescribed literature

CO2 Read, interpret and write analytical essays about prescribed prose pieces

CO3 Use advanced grammar structures to report speech and use the three degrees of comparison for intended emphasis

CO4 Use advanced nuances of language such as idioms and phrasal verbs

CO5 Write reflective, descriptive, expository and imaginative essays with appropriate content, and condense material to a précis

CO6 Use English fluently and accurately for public speaking, extempore and other specific purposes

TEXT BOOKS

- Board of Editors. *Spotlight VI*, India: Ponnsai Publishers & Distributors, 2016.
- Board of Editors. *Active English Grammar and Composition*, India: Trinity Press, 2022

REFERENCE

- Bhatnagar, R. P. *English for Competitive Examinations,* India: Trinity Press, 2017.
- Joseph K. V. *A Textbook of English Grammar & Usage,* India: McGraw Hill Education, 2015
- Sinha, R. P. *Current English Grammar and Usage with Composition*. India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	1 short essay (200 words) out of 2 from Unit I	10
II	1 essay (300 words) out of 2 from Unit II	15
III	5 Passages with 2 Qns. each (from Units I & II)	10
IV	Degrees of Comparison	05
V	Direct Indirect Speech	10
VI	Making sentences – Idioms	05
VII	Phrasal verbs	05
VIII	Spotting errors (Multiple Choice)	10
IX	Correcting the errors (Rewriting)	05
X	Cloze Test	05
XI	Precis Writing	10
XII	Essay Writing	10
	Total	**100**

GENERAL ENGLISH

COURSE - VII

Hours: 6	Course Code: 23UGEL47	Credits: 3

LEARNING OBJECTIVES

LO1 To facilitate learners' reading advanced English through representative pieces of Literature

LO2 To help learners infer and interpret prescribed literature and write coherent, Analytical essays

LO3 To help learners acquire the advanced use of English for professional purposes

LO4 To help learners prepare resume and CVs for professional use

LO5 To encourage learners in using English skillfully and creatively to discuss, brainstorm or debate a topic, through active practice

LO6 To equip learners with the soft skills necessary for employability

I	**DRAMA** William Shakespeare *Julius Caesar*
II	**FICTION** Charles Dickens *Oliver Twist*
III	**SOFT SKILLS 1 (Theory and Practice)** 1.Interview skills* 2. Group Discussion* 3.Debate 4. Interpersonal Skills * Included for Spoken English Viva Voce also
IV	**SOFT SKILLS 2 (Theory and Practice)** 1. Time Management 2. Problem Solving Techniques 3. Teamwork 4. Leadership
V	**APPLICATION & RESUME** 1. Chronological Resume. 2. Functional Resume 3. Responding to the given advertisement

COURSE OUTCOMES

CO1 Read and understand advanced forms of English in Literature

CO2 Interpret and write analytical essays on topics concerning prescribed pieces of literature

CO3 Speak English fluently and accurately in professional contexts

CO4 Prepare application with appropriate Resume structure for employment

CO5 Use English effectively and creatively for interview, group discussion etc.,

CO6 Behave, react and handle situations connected to employability, using the acquired knowledge of soft skills

TEXT BOOKS

- Shakespeare, William. *Julius Caesar,* United Kingdom: Oxford University Press, 2008.
- Dickens, Charles. *Oliver Twist*, United Kingdom: Penguin Classics, 2003

REFERENCE

- Bhatnagar, R. P. *English for Competitive Examinations.* India: Trinity Press, 2017.
- Joseph K. V. *A Textbook of English Grammar & Usage,* India: McGraw HillEducation, 2015
- Sinha, R. P. *Current. English Grammar and Usage with Composition*, India: Oxford University Press, 2018.

S. No.	QUESTION PATTERN	Marks
I	5 Multiple Choice Questions from Unit I	05
II	5 Multiple Choice Questions from Unit II	05
III	1 Essay (400 words) out of 3 from Unit I	15
IV	1 Essay (400 words) out of 3 from Unit II	15
V	2 Annotations out of 3 from Unit I	10
VI	2 Paragraphs out of 3 from Unit II	10
VII	1 Essay out of 2 from Unit III	15
VIII	1 Essay out of 2 from Unit IV	15
IX	Responding to the given Advertisement	10
	Total	**100**

DEPARTMENT OF HUMAN EXCELLENCE

St. Xavier's College (Autonomous), Palayamkottai

Courses offered

Semester	Category	Course Code	Course Title
I	FC	23UHER11/ 23UHEE11	Religion: Catholic Doctrine / Ethics
II	SEC3	23UHEI21	Integrated Personality Development
III	SEC4	23UHEL31	Life Coping and Entrepreneurial Skills Management
IV	EVS	23UEVS41	Environmental Studies
V	VE	23UVEH51	Human Rights and Social Analysis

NME

Semester	Category	Course Code	Course Title
I	Library	23ULBN11	Foundations of Library Science
I	XRF	23UXRN11	Traditional Knowledge of Indian Medicinal Systems
II	Library	23ULBN21	Information Resources
II	XRF	23UXRN21	Indian Traditional Medicinal Foods
III	XRF	23UXRN31	Food Microbiology
IV	XRF	23UXRN41	Herbal Resources and Their Conservation
IV	MAX Forum	23UMXN41	Society, Economy and Politics in Contemporary India

Common Question Pattern

Internal Test

Part A	Answer ALL the questions in one or two lines	5 x 2 = 10
Part B	Answer ALL the questions, each in a paragraph	3 x 5 = 15
Part C	Write an essay on the following	1 x 10 = 10

Semester Exam

Part A	Answer ALL the questions in one or two lines	10 x 3 = 30
Part B	Answer ALL the questions, each in a paragraph	5 x 8 = 40
Part C	Write an essay on each the following	2 x 15 = 30

RELIGION: CATHOLICDOCTRINE
(23UHER11)

SEMESTER:I	VE	HOURS:2	CREDITS: 2	TOTALHOURS:30

Course Outcomes:

Upon completion of the course the students will be able to

1. Recite the Sacraments(K1)
2. Identify the challenges of the present day church(K1)
3. Associate Old and New testaments of the bible(K2)
4. Explain the Church history(K2)
5. Discuss the Marian worship (K2)
6. Summarize the catholic social teachings(K2)

Unit I: Introduction to Bible (6 Hours)

Bible as a Word of God, its inspiration, the Canon - Old and New Testaments and their interconnectedness - Traditional and modern interpretations

Unit II: Introduction to the Church history (6Hours)

The beginnings of the Church - Medieval period and its challenges - The importance of the Second Vatican Council and their decrees - Synodality

Unit III: Introduction to the Sacraments (6Hours)

The origin of the seven sacraments - Their practices and meanings - History of thesacraments

Unit IV: Introduction to Mariology (6Hours)

Mary, Mother of God and Jesus - Mary, our Mother and in the Gospels - Mariology in the history of the Church – Mary as a Prophet of revolution

Unit V: Church in the Contemporary World (6Hours)

The challenges of the present day Church – Casteism and Same sex marriage – Ecumenical unity and Inter Religious harmony - Catholic Social Teachings

REFERENCES:

1. Paul C. Jesuraj, Growing in Your Faith, July 2022.
2. Second Vatican Council Documents

ETHICS
(23UHEE11)

SEMESTER: I	VE	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcomes :

Upon completion of the course the students will be able to

- Describe the Ethical foundations and human history (K1)
- Identify Ethics and its relationship with Religions (K1)
- List the personal ethical codes to be practices in day to day life (K1)
- Associate ethics in family and society (K2)
- Summarize modern ethical issues and problems (k2)
- Discuss bio and environmental ethics (k2)

Unit I : Introduction to Ethics **(6 Hours)**

Meaning, Nature and Scope of Ethics - Challenges and Importance of ethics - Basic Ethical Foundations

Unit II : Ethics in Religions **(6 Hours)**

Ethical foundations and meanings in big and small traditions - Ethics and its relationship with Religions

Unit III : Personal Ethics **(6 Hours)**

Moral precepts - Dynamics of personal morality - Moral Conscience - Ethical aspects of Thirukural – Evils of Corruption – Gandhi's Seven Deadly Sins.

Unit IV : Family Ethics and Social Ethics **(6 Hours)**

Role of Family in ethical formulations- Respecting persons - Peace and Justice - Human Duties

Unit V : Modern Ethical Issues **(6 Hours)**

Bio Ethics - Media Ethics - Environmental Ethics –Cyber Ethics

REFERENCES:

1. Ethics prepared by School of Interdisciplinary and Trans-disciplinary Studies, Indira Gandhi National Open University (MPYE 002)
2. Course material prepared by the Department of Human Excellence.

INTEGRATED PERSONALITY DEVELOPMENT
(23UHEI21)

SEMESTER: II	SEC3	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcomes:

Upon completion of the course the students will be able to

- Identify personal strengths and weaknesses (K1)
- Identify the means of self-esteem (K1)
- Identify the means of improving personal performance(K1)
- Explain the techniques of self-management(K2)
- Describe coping strategies of learning (K2)
- Discuss the traits of personal competence(K2)
- Summarize different dimensions of Personality (K2)

UNIT I: Self – Knowledge **(6 Hours)**

Exploring habits, attitudes, preferences and experience –SWOC analysis – Johari Window – Enhancing one's self image, self-esteem, self confidence

UNIT II: Self-Management **(6 Hours)**

Understanding of life story - Focusing on Internal narratives - Managing change, confusion and uncertainty –Goal setting – Personal Vision and Mission statements

UNIT III: Personal Competence and Maturity **(6 Hours)**

Motivation - Developing rapport - Giving and receiving constructive criticism - Assertiveness and negotiation skills – Leadership – Type of Leadership – Qualities of a good leader

Unit IV: Dimensions of Personality Development **(6 Hours)**

Recognizing the gradual growth in different dimension of one's personality such as (a) Physical (b) Intellectual (c) Emotional (d) Moral (e) Social and (f) Spiritual - Learning the Development process; Tools and Skills - Helping to maximize one's potentials

Unit IV: **Academic Learning Strategies** **(6 Hours)**

Memory - Art of generative listening, learning and writing - Note making - Presentation skills - Time management - Receptive skills - Classroom etiquettes - Cyber knowledge

REFERENCE BOOKS:

1. Dr. Xavier Alphonse S.J., We Shall Overcome, ICRDEC Publications, Chennai, 2004.
2. Personality Development, Harold R. Wallace and L. Ann Masters, South-Western, Cengage Learning India PL, New Delhi, 2006.
3. Course material prepared by the Department of Human Excellence

LIFE COPING AND ENTREPRENEURIAL SKILLS MANAGEMENT
(23UHEL31)

SEMESTER: III	SEC4	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcomes :

Upon completion of the course, the students will be able to

1. Identify the various challenges faced in adolescence (K1)
2. Tabulate healthy habits and lifestyle (K1)
3. Identify problem solving strategies (K1)
4. Discuss family and professional relationship(K2)
5. Explain cognitive, emotional and behavioural perspectives (K2)
6. Describe evils of addiction and the remedies available (K2)

Unit I: Physical AND Mental Wellbeing (6 Hours)

Adolescent Health and Holistic Health - Understand and appreciate physical Self - Personal hygiene and grooming - Balanced diet - Healthy habits and lifestyle - Sound body and mind - Nurturing health at home, in campus –Definition of Health - Women health – various medicine systems

Unit II: Interpersonal and Social Wellbeing (6 Hours)

Family Relationship: Values in family relationship, Nuclear, Joint Family, Dependence, Overdependence, Happy family, Broken Family - Caring Elders - Rapport Building with Peers/ Friends, Strangers, Transgenders - Professional Relationship : Officials, Mentors, Staff & Service Personnel- Other centeredness and others point of view and Empathy

Unit III: Problem-solving and Decision making skills (6 Hours)

Decision making processes - Lateral Thinking and problem-solving strategies - Select and apply problem-solving strategies to more complex tasks and problems - Gain familiarity with concepts such as performance indicators and benchmarking – Counseling.

Unit IV: Coping Strategies (6 Hours)

Conflict/Crisis Management –Stress Management – Emotional Management - Team, Task and Resource Management – Ignatian Discernment Process

Unit V: Overcoming Addiction (6 Hours)

Various stages of addiction- Gadgets addiction - Substance abuse - Media addiction – Internet addiction – Impact, prevention and remedies.

REFERENCE BOOKS:

1. Dr. Xavier Alphonse S.J., We Shall Overcome, ICRDEC Publications, Chennai, 2004.
2. Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998.
3. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
4. Course Material prepared by the Department of Human Excellence.

ENVIRONMENTAL STUDIES
(23UEVS41)

SEMESTER: IV	EVS	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course objective:

To cater to students from diverse disciplinary backgrounds and to sensitise them about the commitment of our nation towards achieving sustainable development goals and addressing global environmental challenges.

Course outcomes:

The student will be able to:

1. Describe various natural resources and the need for sustainable development (K1).
2. Relate biodiversity and its conservation approaches (K2).
3. Solve the environmental issues of concern and discover prevention strategies (K3).
4. Sensitize and categorize the adverse health impacts of pollution (K3).
5. Assess environmental quality and risks for climate change mitigation (K4 & K5).
6. Recognize the major treaties to safeguard Earth's environment and resources (K2).

Unit I: Natural Resources and Sustainable Development (6 hours)

Overview of natural resources: definition, classification. Biotic resources: major types, status and challenges. Water resources: types, over-exploitation, issues, challenges, water scarcity, conflicts. Soil and mineral resources: important minerals, problems, soil as a resource. Energy resources: sources, conventional and non-conventional, implications. Introduction to sustainable development: SDGs, targets and indicators, challenges and strategies.

Unit II: Conservation of Biodiversity and Ecosystems (6 hours)

Biodiversity and its distribution: Levels and types, India and world, hotspots, threat categories. Ecosystems and ecosystem services: major types in India, basic characteristics, significance. Threats to biodiversity and ecosystems: land use, commercial exploitation of species and invasive species. Major conservation policies: in situ, ex situ, protected areas, traditional knowledge, community based conservation, gender and conservation.

Unit III: Environmental Pollution and Health (6 hours)

Understanding disaster and pollution: definitions, natural and man-made, point source and non-point source, kinds. Air and water pollution: criteria pollutants, sources, and adverse effects, quality standards. Soil and noise pollution: sources and health effects. Thermal and radioactive pollution: sources and impact on health and ecosystems.

Unit IV: Climate Change: Impacts, Adaptation and Mitigation (6 hours)

Understanding climate change: structure of atmosphere, natural and anthropogenic variations, importance of 1.5 °C and 2.0 °C limits to global warming, projections of climate change in Indian subcontinent. Impacts, vulnerability and adaptation to climate change. Mitigation of climate change: GHG reduction vs. sink enhancement, concept of carbon intensity, energy intensity and carbon neutrality; policy instruments, carbon capture and storage, climate justice.

Unit V: Environmental Treaties and Legislation (6 hours)

Overview of instruments of international cooperation: bilateral, multilateral, conventions and protocols, COPs. Major International Environmental Agreements: CBD, CITES, UNCCD, UNFCCC. Major Indian Environmental Legislations: acts, rules, sites, areas, zones and judgements. Major International organisations and initiatives: UNEP, IUCN, WCED, UNESCO, IPCC, MAB.

Reference books

1. Singh, J.S., Singh, S.P., Gupta, S.R. (2006). Ecology, Environment and Resource Conservation. Anamaya Publications.
2. Harris, Frances (2012). Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
3. Krishnamurthy, K.V. (2003). Textbook of Biodiversity, Science Publishers, Plymouth, UK.
4. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI).
5. Pittock, Barrie (2009). Climate Change: The Science, Impacts and Solutions. 2nd Edition. Routledge.
6. Ministry of Environment, Forest and Climate Change (2019). A Handbook on International Environment Conventions & Programmes.
7. KanchiKohli, Manju Menon (2021). Development of Environment Laws in India, Cambridge University Press.

HUMAN RIGHTS AND SOCIAL ANALYSIS
(23UVEH51)

SEMESTER: V	VE	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcomes :

Upon completion of the course, the students will be able to

- Describe Indian social scenario (K1)
- List the different kinds of fundamental rights (K1)
- Discuss major social problems in India (K2)
- Analyze critically society and its network of relationships (K4)
- Analyze local and global social problems (K4)
- Describe redressal mechanisms for human rights violations (K6)

Unit I: World trends today and Indian Scenario (6 Hours)

Some basic data – Globalization - World Social Forum vs World Economic Forum - The North South divide – Democracy - Types of Governance in the world – Demography and Basic Data of India

Unit II: IndianSocial System (6 Hours)

Social Analysis - Social system and its components - Interdependence of human being and society - A land of cultural linguistic and religious diversity - secularism-communalism-fundamentalism-Indian politics and religion-problems of the minority.

Unit III: Major Social Problems I (6 Hours)

Indian Economic inequality and Poverty; Manifestation and Measurement; Incidence and Magnitude; Causes, problems of poor and pains of poverty; the remedy - Ignorance in Governance and corruption: The Concept; Causes and Impact of Corruption; Combating Corruption - Illiteracy:Magnitude, Causes and Consequences

Unit IV: Major Social Problems II (6 Hours)

Caste Discrimination: caste discrimination and process of exclusion, Honour Killing, Untouchability, Caste Politics, Reservation policy –Dalit Empowerment - Child abuse, child labour - Effects of Abuse on Children - Violence against women: Harassment; Nature, Extent and Characteristics– Empowerment of Women - LGBTQIA+ – Currently pressing issues.

Unit V: Human Rights, Indian Constitutionsand Empowerment (6 Hours)

Universal Human Rights: The concept – Evolution – Organizations and Recent Developments – Indian Constitutions: Preamble - Political and Civil fundamental rights and duties. Empowerment Models: Communitarian and Local Models – Social Reformers: Ambedkar, Gandhi, Muthulakshmi Reddy and Periyar - Dreams and hopes for better India.

REFERENCE BOOKS:

1. P.N. Sharma, “Social problems and issues in India”, Bharat Book Centre, 2014
2. New India, The Reality Reloaded, Gurjot S. Kaler, Chandigarh, India, 2018
3. Course Material Prepared by the Department of Human Excellence

FOUNDATIONS OF LIBRARY SCIENCE
(23ULBN11)

SEMESTER: I	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

COURSE Outcomes: At the end of the course the students will be able to

CO1. Comprehend the Evolution, Significance, and Fundamental Operations of Libraries. (K2)
CO2. Develop Effective Reading Strategies and Critical Thinking Skills. (K3)
CO3. Differentiate and grasp the distinct roles and functions of various types of libraries. (K4)
CO4. Explore Modern Library Services and the Impact of Digital Resources. (K4)
CO5. Recognize the potential of VR, AI, and chatbots in enhancing user support within library environments. (K5)

UNIT 1 **(6 Hours)**

INTRODUCTION TO LIBRARY

The history and evolution of libraries - Need - Purpose - Functions - Five Laws of Library Science.

UNIT 2 **(6 Hours)**

TYPES OF LIBRARY

Public – Academic – Special - National. (Definition, purpose and functions of each type of library.

UNIT 3 **(6 Hours)**

LIBRARY SERVICES AND COLLECTION DEVELOPMENT

Reference services and reader advisory- Collection development and Management - E-books - E-journals Database - Bulletin Boards.

UNIT 4 **(6 Hours)**

EMERGING TECHNOLOGIES IN LIBRARIES

Virtual reality and augmented reality in libraries - AI and chatbots for user support - Internet of Things (IoT) applications in libraries.

UNIT 5 **(6 Hours)**

READING CULTURE FOR LIBRARY PRACTITIONERS

Value of Reading in Professional Development - Exploring Diverse Reading Materials - Effective Reading Techniques - Critical Thinking and Reflection.

Text Book

Kumar P S G, Foundations of Library and Information Science B. R. Publishing Corporation

Reference

1. Khanna J K, Library and Society, Kurukshetra University, Kurukshetra
2. Kumar P S G, Foundation of Library and Information Science Paper 1 of UGC Model Curriculum, B.R. Publishing Corporation

TRADITIONAL KNOWLEDGE OF INDIAN MEDICINAL SYSTEMS
(23UXRN11)

SEMESTER: I	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course outcomes: At the end of the course the students will be able to

CO1: Understand the concepts of ethno botany and its branches (K1).
CO2: Provide a strong foundation in the principles of ethno medicine and its applications (K2 & K4).
CO3: Inculcate knowledge and make the students aware of the commercial value of medicinal plants (K2 & K3).
CO4: Give an insight into the edible and medicinal plants in tribal medicine (K3).
CO5: Comprehend the advances made in the field of plant biotechnology in conservation of medicinal plant resources (K4).
CO6: Understand ethno botany of the Western Ghats, their medicinal and commercial values and conservation (K1- K4).

Unit I: Ethnobotany (6 hours)

History of Ethnobotany, concept, scope and objectives. The relevance of ethnobotany in the present context. Major ethnic groups in Tamil Nadu.

Unit II: Traditional medicines (6 hours)

Medicinal plants used by Tribals. Ethnobotanical formulations; Ethnobotanical uses of selected medicinal plants with a) *Azadiracthaindica b) Ocimumtenuiflorum c) Vitexnegundo. d) Gloriosasuperba e) Tribulusterrestris f) Pongamiapinnata g) Senna auriculata h) Indigoferatinctoria*. Importance and scope of medicinal plants used by *Paliyans*.

Unit III: Commercial value of traditional medicinal plants (6 hours)

Raw drugs from ethnomedicinal plants - Economic potentials of selected ethnomedicinal plants. Ethnobotany as a source of important drugs a) Reserpine b) Artemisin c) Gugulipid d) Cathranthin e) Strychnine. Export of medicinal plants and their products.

Unit IV: Collection, Utilization and Conservation of Traditional Medicinal Plants (6 hours)

The significance of wild medicinal plants – Collection and utilization of medicinal plants – Therapeutics uses of wild medicinal plants. Role of ethnic groups in the conservation of plant genetic resources. Participatory forest management.

Unit V: Conventional and modern aspects of medicinal plant propagation (6 hours)

Plant Propagation; Methods of propagation – conventional - vegetative cutting, layering grafting etc., Modern methods- Tissue culture; Micropropagation, isolation of secondary metabolites from *in vitro* culture

Textbooks:

1. P.C. Trivedi, Dr. Pravin Chandra 2011. Text Book of Ethnobotany, Pointer Publishers.
2. Bir Bahadur, K. V. Krishnamurthy, T. Pullaiah. 2021. Ethnobotany of India, 5-Volume Set. Apple Academic Press
3. Jain, A. and Jain, S.K. 2016. Indian Ethno botany - Bibliography of 21st Century Scientific Publishers (India).
4. Cunningham, A. B. (2001). Applied Ethnobotany. Earthscan publishers Ltd. London & Sterling
5. Indian Medicinal Plants -An Illustrated Dictionary-C.P. Khare (Ed.) 2019, ©Springer Science+Business Media, LLC.

Reference Books

1. Paul E. Minnis 2000. Ethnobotany: A Reader. University of Oklahoma Press
2. Gary J. Martin, 2014. Ethnobotany A Methods Manual. Springer US.
3. T. Pullaiah, Bir Bahadur, K. V. Krishnamurthy. 2016. Ethnobotany of India Western Ghats and West Coast of Peninsular India. Apple Academic Press
4. Ministry of Environment and Forests. 1994. Ethno biology in India. A Status Report. All India Coordinated Research Project on Ethno biology. Ministry of Environment and Forests. New Delhi
5. Albuquerque, U.P., Ramos, M.A., Júnior, W.S.F., and De Medeiros, P.M. 2017. Ethnobotany.

Web Resources

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2816487/
- https://www.wipo.int/edocs/pubdocs/en/wipo_pub_tk_6.pdf
- https://main.ayush.gov.in/ayush-systems/ayurveda/faq
- https://www.who.int/news
- https://www.csir.res.in/documents/tkdl
- https://www.meity.gov.in/content/national-digital-library

INFORMATION RESOURCES
(23ULBN21)

SEMESTER: II	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcomes: Upon completion of the course, the students will be able to

CO1. learn all kinds of Secondary Sources. (K1)
CO2. Learn electronic reference materials. (K1)
CO3. Understand the concept and importance of Primary, Secondary and Tertiary sources (K2)
CO4. Analyze the different Non Documentary Sources (K4)
CO5. Assess electronic information sources, including e-books and e-journals. (K4)

UNIT-I : Introduction to Information Sources (6 Hours)

Definition, Type, Characteristics - Primary, Secondary, Tertiary –Evaluation of print Reference Sources

UNIT-II: Secondary Sources (6 Hours)

Definition, Types- Dictionaries, Encyclopedia, Directories, Manuals and Handbooks, Bibliographic sources

UNIT-III : Non – Documentary Source (6 Hours)

Formal and Informal – Human Sources, Institutional Information Sources, Technological Gate Keepers and Invisible Colleges.

UNIT-IV : Electronic Information Sources (6 Hours)

Meaning- Characteristics- Research database Open Access Resources-Audio resources

UNIT-V: Online Publishers (6 Hours)

Detailed study of E-books (Amazon, Sage Publication), E-journals (Springer, Verlog), Database (PROQUEST, EBSCO), Evaluation of E-Resources.

Reference Books:

- Singh, G. (2011).Digital libraries and digitization. EssEss Publications.
- 2. Baby M.D. (2000) Peter Clayton, G. E. Gorman. Managing Information Resources in Libraries. Cambridge Publishers.

INDIAN TRADITIONAL MEDICINAL FOODS
(23UXRN21)

SEMESTER: II	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course outcomes: At the end of the course the students will be able to

CO1: Know the foundational principles of health supplements such as functional foods, nutraceuticals, superfoods, etc., and assess their potential within the market context (K1).
CO2: Understand thecore principles of nutrition, including carbohydrates, proteins, lipids, vitamins, minerals, health-enhancing phytochemicals, and antinutritional factors (K2).
CO3: Get knowledge about the origins, traditional uses, nutritional composition, and health advantages of selected plant-based foods (K1).
CO4: Know the scientific rationale underlying the health benefits and potential adverse effects of various food substances (K3).
CO5: Identify the indigenous wild edible plants found in the Southern Western Ghats and their role in enhancing food security (K1).
CO6: Comprehend the fundamental concepts related to food and its significance in promoting health, specifically addressing contemporary health challenges, and demonstrate the ability to apply this knowledge in daily life (K1-K3).

Unit I: FOOD CULTURE (**6 Hours)**
Concept of food and its medicinal value - Food and health in Indian traditional medicine - Effect of globalization on food culture - Fast foods, Junk foods and their impact on the health of children and youth population - Emerging trends in health supplements

Unit II: MACRONUTRIENTS (**6 Hours)**
Carbohydrates and their role in health - Cereals, Millets, and Pseudo - Cereals - Proteins and their importance on health -Pulses and their health benefits - Lipids and their health impacts - Nuts and oil seeds

Unit III: MICRONUTRIENTS (**6 Hours)**
Vitamins, minerals and their health impacts - Hidden hunger - Greens, Vegetables and Fruits

Unit IV: PHYTOCHEMICALS (**6 Hours)**
Health promoting phytochemicals and antinutritional factors - Spices, and beverages - Lower plants as food sources - Mushrooms and their health benefits

Unit V: WILD EDIBLES & FOOD SECURITY (**6 Hours)**
Tribal knowledge of food plants - Seasonal foods and wild edible plants of *Kanikaran* and *Paliyan* tribes of Tamil Nadu - Sustainability, Food Security, and Health

Text books:

1. Begum, R.M. 2008. A Textbook of Foods, Nutrition & Dietetics, Sterling Publishers Pvt. Ltd.
2. Mudambi, S.R., Rajagopal, M.V. 2007. Fundamentals of foods, nutrition and diet therapy. New Age International.

References:

1. Gopalan, C., Sastri, B.V.R., Balasubramanian, S.C. 2014. Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad
2. Dietary Guidelines for Indians – A Manual (English), National Institute of Nutrition, Hyderabad

FOOD MICROBIOLOGY
(23UXRN31)

SEMESTER: III	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course outcomes: Upon successful completion of this course, students should be able to:

CO1: Understand the fundamental principles of food microbiology and its importance in the food industry; Apply laboratory techniques for microbial analysis in food samples (K1).

CO2: Identify and characterize common food borne pathogens and their sources (K2).

CO3: Evaluate methods for food spoilage prevention and preservation (K2).

CO4: Describe the role of fermentation in food production and its health implications (K2).

CO5: Analyze emerging trends and ethical considerations in food microbiology; Apply regulatory guidelines and best practices for ensuring food safety and quality (K3).

CO6: Communicate effectively about food microbiology topics in both written and oral formats; Demonstrate critical thinking and problem-solving skills in food safety and quality assurance (K1-4).

Unit 1: Introduction to Food Microbiology (6 hours)

Overview of Food Microbiology; Historical Perspective; Microbial Classification and Taxonomy; Microbial Growth and Factors Affecting Growth; Laboratory Techniques in Food Microbiology

Unit 2: Food borne Pathogens (6 hours)

Common Food borne Pathogens (e.g., *Salmonella, Escherichia coli, Listeria, Campylobacter*); Sources of Food borne Pathogens; Detection and Control Strategies; Food borne Illness Outbreaks and Investigations; Food Safety Regulations

Unit 3: Food Spoilage Microorganisms (6 hours)

Types of Food Spoilage Microorganisms; Factors Influencing Food Spoilage; Spoilage Detection and Prevention; Food Preservation Methods; Food Packaging and Shelf-Life Extension

Unit 4: Food Fermentation (6 hours)

Fermentation in Food Production; Microorganisms Used in Fermentation; Fermented Food Products (e.g., yogurt, cheese, bread); Health Benefits of Fermented Foods; Quality Control in Fermentation

Unit 5: Food Safety and Quality Assurance (6 hours)

Food Safety Management Systems (HACCP); Good Manufacturing Practices (GMPs); Food Testing and Analysis; Risk Assessment and Management; Emerging Trends in Food Safety

Reference Books:

1. Food Microbiology: An Introduction by Thomas J. Montville and Karl R. Matthews, 2017
2. Foodborne Pathogens: Microbiology and Molecular Biology by Pina M. Fratamico, Arun K. Bhunia, and James L. Smith, 2005
3. Food Microbiology: Fundamentals and Frontiers by Michael P. Doyle, Robert L. Buchanan, and Vijay K. Juneja, 2019
4. Fermented Foods and Beverages of the World by Jyoti Prakash Tamang,2010
5. Food Safety Management: A Practical Guide for the Food Industry by Yasmine Motarjemi and HuubLelieveld, 2014

HERBAL RESOURCES AND THEIR CONSERVATION
(23UXRN41)

SEMESTER: IV	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course outcomes: At the end of the course the students will be able to

CO1: Understand the concepts in herbalism, medicinal plant trade and National policies (K2)

CO2: Recognize the threats and importance of conserving the medicinal plant resources (K2)

CO3: Explore the important medicinal plant resources of India, their scientific rationale and applications (K3)

CO4: Learn the good agricultural and collection practices of medicinal plants (K1)

CO5: Know the cultivation and post-harvest processing of selected medicinal plants cultivated Tamil Nadu (K2)

CO1: Understand the role of plant resources in global healthcare and its conservation (K1-K3)

Unit I: SCENARIO OF HERBALISM (**6 Hours)**

History of herbalism - Herbalism across the globe - Trade of herbals in ancient and contemporary India - Global herbal market and India's position

Unit II: UNSUSTAINABLE USE OF HERBAL RESOURCES (**6 Hours)**

Basics of endemism, IUCN categories of threat and CITES - Market demand - Negative impacts of collection from wild resources - Overexploited medicinal plants of India - *In situ* and *ex situ* conservation

Unit III: HIGHLY USED HERBALS OF INDIA (**6 Hours)**

Botany, identification, chemistry and applications of *Aswagandha, Seenthil, Nilavembu, Brahmi, Garcinia, Glycyrrhiza, Amla, Vilvam, Keelanelli*and*Satavari*

Unit IV: CULTIVATION & POST-HARVEST PROCESSING (**6 Hours)**

Good agricultural practices - Good collection practices - Storing medicinal plants – Post-harvest methods and value addition

Unit V: CULTIVATION OF SELECTED MEDICINAL PLANTS (**6 Hours)**

Good agricultural and collection practices for *Senkanthal, Senna, Vinca,Tulsi* and *Asogu*- Government schemes for cultivation of medicinal plants - Kitchen and home herbal gardens

Text book:

Wallis, T.E. 2018. Textbook of Pharmacognosy (Reprinted edition), CBS Publishers, New Delhi.

References:

1. Anonymous, Agro-techniques of selected medicinal plants Vols. I-III. 2014. National Medicinal Plants Board, Government of India.
2. Anonymous, WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants. 2003. WHO, Geneva.
3. Ravikumar, K., Ved, D.K. 2000. Illustrated Field Guide to 100 Red Listed Medicinal Plants of Conservation Concern in southern India, FRLHT, Bangalore.
4. Ved, D.K., Goraya, G.S. 2007. Demand and Supply of Medicinal Plants in India. NMPB, New Delhi & FRLHT, Bangalore.

SOCIETY, ECONOMY AND POLITICS IN CONTEMPORARY INDIA
(23UMXN41)

SEMESTER: IV	NME	HOURS: 2	CREDITS: 2	TOTAL HOURS: 30

Course Outcome:

On completion of the course, the students will be able to

CO1: Relate the concept of state and government (K1)
CO2: Understand and evaluate different types of societies in India (K2 & K5)
CO3: Identify and compare role of market in different types of economy (K3)
CO4: Examine and compare ideas of Ambedkar with other social, economic and political reformers (K4 & K5).
CO5: Analyse and formulate the casteless society in India.

UNIT I: STATE AND GOVERNMENT (6 Hours)

State and Government: Meaning and concepts – Features, characteristics and Nature of State and its dynamics in India

UNIT II: DYNAMICS OF SOCIETY (6 Hours)

Society: concept, meaning and basic characteristics of society – different types of societies – stratification of societies in India – Rural-Urban Structures and social Institutions.

UNIT III: ECONOMY AND MARKET (6 Hours)

Economy and Market: Meaning and concept, basic characteristics and types of economies – dynamics of economy and market in new economic policy era.

UNIT IV: SOCIAL, ECONOMIC AND POLITICAL THINKERS IN INDIA (6 Hours)

JyotiraoPhule, Periyar, Gandhi, Ambedkar and Amartya Sen on interaction of society, economy and politics and its dynamics.

UNIT V: BUILDING CASTELESS SOCIETY (6 Hours)

Annihilation of Caste: Meaning and concept - Meaning of sati, childhood marriage, endogamous and exogamy of marriage - Status of Dalit and women in Indian society – Dalit and women emancipation.

References:

1. Jodhka, S. S. (2002). Nation and village: Images of rural India in Gandhi, Nehru and Ambedkar. *Economic and political weekly*, 3343-3353.
2. Jodhka, S. S. (2010). Dalits in business: Self-employed scheduled castes in North-West India. *Economic and Political Weekly*, 41-48.
3. Jodhka, S. S. (2016). Ascriptive hierarchies: Caste and its reproduction in contemporary India. *Current Sociology*, *64*(2), 228-243.
4. Jodhka, S. S., &Fazal, T. (2021). Religion and Politics in South Asia. Sociological Bulletin, 70(4), 447–452. https://doi.org/10.1177/00380229211062752
5. Mitra, S. K. (1993). Caste, democracy and the politics of community formation in India. *The Sociological Review*, *41*(1_suppl), 49-71.

6. Mosse, D. (2020). The modernity of caste and the market economy. *Modern Asian Studies*, *54*(4), 1225-1271.
7. Nayyar, D. (1998). Economic development and political democracy: interaction of economics and politics in independent India. *Economic and Political Weekly*, 3121-3131.
8. Robinson, R. (2014). Planning and economic development: Ambedkar versus Gandhi. *Invoking Ambedkar: Contributions, Receptions, Legacies*, 59-71.
9. Singh, A. (2014). Gandhi and Ambedkar: Irreconcilable Differences? *International Journal of Hindu Studies*, *18*(3), 413-449.
10. Stiglitz, J. E. (2016). *The state, the market, and development* (No. 2016/1). WIDER Working Paper.
11. Vikas, R. M., Varman, R., & Belk, R. W. (2015). Status, caste, and market in a changing Indian village. *Journal of Consumer Research*, *42*(3), 472-498.

PROPERTIES OF MATTER AND ACOUSTICS

COURSE CODE : 23UPHC11

SEMESTER - I	CORE – T1	HOURS – 6	CREDITS – 6	TOTAL HOURS : 90

COURSE OUTCOMES : At the end of the course, the student will be able to

CO1 : Identify the materials suitable for construction of buildings, based on the modulii of elasticity.

CO2 : Have knowledge on the properties of liquids and its mechanism.

CO3 : Understand the physics of sound and its applications

CO4 : Know the different methods of producing ultrasonic waves and its applications

CO5 : To understand the concepts of acoustic comfort and better understanding of the theories used in building acoustics

UNIT - I : ELASTICITY (18 Hours)

Hooke's law – stress - strain diagram – elastic constants – Poisson's ratio – relation between elastic constants and Poisson's ratio – work done in stretching and twisting a wire – twisting couple on a cylinder – rigidity modulus by static torsion – torsional pendulum.

UNIT - II : BENDING OF BEAMS (18 Hours)

Cantilever – expression for Bending moment – expression for depression at the loaded end of the cantilever – oscillations of a cantilever – expression for time period – experiment to find Young's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope.

UNIT - III : FLUID DYNAMICS (18 Hours)

Surface tension: definition – molecular forces – excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method – variation of surface tension with temperature.

Viscosity: definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula – corrections – terminal velocity and Stoke's formula – variation of viscosity with temperature.

UNIT - IV : WAVES AND OSCILLATIONS (18 Hours)

Simple Harmonic Motion (SHM) – differential equation of SHM – graphical representation of SHM – composition of two SHM in a straight line and at right angles – Lissajous's figures - free, damped, forced vibrations – resonance and Sharpness of resonance Laws of transverse vibration in strings – sonometer – determination of AC frequency using sonometer – determination of frequency using Melde's string apparatus.

UNIT - V : ACOUSTICS OF BUILDINGS AND ULTRASONICS (18 Hours)

Intensity of sound – decibel – loudness of sound – reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings.

***Ultrasonic waves*:** production of ultrasonic waves – Piezoelectric crystal method –

magnetostriction effect – application of ultrasonic waves

TEXT BOOKS :

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand & Co.
2. BrijLal & N. Subramanyam, 2003, Properties of Matter, S.Chand & Co.
3. D.R.Khanna & R.S.Bedi, 1969, Textbook of Sound, Atma Ram & sons
4. BrijLal and N.Subrahmanyam, 1995, A Text Book of Sound, Second Revised Edition, Vikas Publishing House.
5. R.Murugesan, 2012, Properties of Matter, S.Chand & Co.

REFERENCE BOOKS :

1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers.
2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth Edition, R. Chand & Co.
3. A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold - Heinmann, India.

CORE - PRACTICAL

PROPERTIES OF MATTER AND ACOUSTICS (Any Seven)

COURSE CODE : 23UPHC12

SEMESTER - I	CORE – P1	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

OBJECTIVES : To apply various physics concepts, to understand Properties of Matter, set up experiments, verify theories, quantify and analyse the theory, able to do error analysis and correlate results.

1. Determination of rigidity modulus without masses using Torsional Pendulum.
2. Determination of rigidity modulus with masses using Torsional Pendulum.
3. Determination of Young's modulus by uniform bending – Pin and Microscope.
4. Determination of Young's modulus by non-uniform bending – Scale & Telescope.
5. Determination of Young's modulus by Cantilever – Load Depression Graph.
6. Determination of rigidity modulus by Static Torsion.
7. Determination of surface tension & interfacial surface tension by Drop Weight method.
8. Determination of co-efficient of viscosity by Stokes' method – Terminal velocity.
9. Determination of viscosity by Poiseullie's Flow method.
10. Determination of g using Compound Pendulum.

ALLIED: MATHEMATICS – I

(Course Code: 23UMTE11)

Semester - I	EC - 1	Hours - 6	Credits - 5

Course outcomes: By the end of the course the students will be able to

CO 1. Define the rank of matrix.(K1)

CO 2. Discuss hyperbolic functions and inverse hyperbolic functions.(K2)

CO 3. Explain the relation between the coefficients and the roots of algebraic equation.(K2)

CO 4. Solve the system of linear equations.(K3)

CO 5. Analyze binomial series, exponential series and logarithmic series.(K4)

CO 6. Compare two sets of data using correlation. (K5)

UNIT I:

Binomial Series – Exponential Series – The Logarithmic series

(Text book 1: Chapter 1: Sections 1.2-1.4)

UNIT II:

Nature of roots - Relation between the coefficients and the roots of an algebraic equation -Transformation of equations

(Text book 1: Chapter 2: Sections 2.1-2.3)

UNIT III:

Rank of a matrix - Simultaneous linear equations - Cayley - Eigen values and Eigen vectors

(Text book 1: Chapter 3: Sections 3.2 – 3.4)

UNIT IV:

Expansion of sin θ and cos θ tan in a series of ascending powers of θ - Hyperbolic function - Inverse hyperbolic function – Logarithm of complex numbers.

(Text book 1: Chapter 5: Sections 5.3 – 5.5)

UNIT V:

Correlation – Rank Correlation – Regression

(Text book 2: Chapter 1)

Text books:

1. S. Narayanan, R. Hanumantha Rao, T.K. Maicavachagom Pillai and P. Kandaswamy, Ancillary Mathematics Volume I, S. Viswanthan (Printers and Publishers) Pvt. Ltd., 2009.

2. S. Arumugam and Issac, Allied Mathematics paper V, New Gamma Publishing House, 2004

PHYSICS FOR EVERYDAY LIFE (NME)
COURSE CODE : 23UPHN11

SEMESTER - I	SEC – 1	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

COURSE OUTCOMES: At the end of the course, the students will be able
CO1: To know where all physics principles have been put to use in daily Life
CO2 : To understand the concepts of mechanical objects Optics and Laser
CO3 : To know the applications of Solar energy
CO4 : To appreciate the concepts with a better understanding
CO5 : To know about Indian scientists who have made significant contributions to Physics.

UNIT - I : MECHANICAL OBJECTS (6 Hours)

Spring scales – bouncing balls – roller coasters – bicycles – rockets

UNIT - II : OPTICAL INSTRUMENTS AND LASER (6 Hours)

Vision corrective lenses – polaroid glasses – UV protective glass – Digital camera – holography and laser.

UNIT - III : PHYSICS OF HOME APPLIANCES (6 Hours)

Bulb –Tube light- fan – hair drier – television – air conditioner – microwave oven

UNIT - IV : SOLAR ENERGY (6 Hours)

Solar constant - General applications of solar energy – Solar water heaters – Solar Photo – voltaic cells – General applications of solar cells.

UNIT - V : INDIAN PHYSICISTS AND THEIR CONTRIBUTIONS (6 Hours)

Sir C.V.Raman, Homi Jehangir Bhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, Venkatraman Ramakrishnan, Dr. APJ Abdul Kalam and their contribution to science and technology.

TEXT BOOKS

1. The Physics in our Daily Lives, Umme Ammara, Gugucool Publishing, Hyderabad, 2019.
2. For the love of physics, Walter Lawin, Free Press, New York, 2011.

HEAT AND THERMODYNAMICS
COURSE CODE : 23UPHC21

SEMESTER - II	CORE – T2	HOURS – 6	CREDITS – 5	TOTAL HOURS : 90

COURSE OUTCOMES : At the end of the course**,** the student will be able to

CO1 : Acquires knowledge on how to distinguish between temperature and heat.

CO2 : Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines.

CO3 : Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy & entropy.

CO4 : Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them.

CO5 : Interpret classical statistics concepts such as phase space, ensemble, Maxwell - Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac.

UNIT- I : Thermometry and Calorimetry **(18 Hours)**

Platinum resistance thermometer - Calendar and Griffith's bridge - Thermoelectric effect – Seebeck effect - Thermoelectric thermometers- International temperature scale – Thermistor - Specific heat capacity of solids – Regnault's method of mixtures(solid) – specific heat capacity of liquids – Callendar and Barnes method – Specific heat capacity of gases – C_p and C_v – Meyer's relation – C_v by Joly's differential steam calorimeter method – C_p by Regnault's method.

UNIT- II : Low Temperature Physics **(18 Hours)**

Joule - Kelvin effect - Liquefaction of Air - Linde's Process –Liquefaction of hydrogen - liquefaction of helium – Kammerling - Onne's method - Helium I and II - Lambda point - Production of low temperatures - adiabatic demagnetization - Practical applications of low temperature.

UNIT - III: Transmission of Heat **(18 Hours)**

Conduction – Coefficient of thermal conductivity – Rectilinear flow of heat along a bar – Convection – Lapse rate – Stability of the atmosphere – Newton's law of cooling – determination of specific heat capacity of liquid - Radiation - black body – Kirchhoff's law – Stefan – Boltzmann law - energy distribution in black body spectrum - Wien's law – Rayleigh Jean's law – Planck's law - Solar constant – Water flow pyroheliometer.

UNIT - IV: Kinetic Theory of Gases **(18 Hours)**

Kinetic Theory of gases - Assumptions - Molecular collisions – Mean free path – Expression for mean free path – Transport phenomenon – Brownian motion and its features - Expression for viscosity, Diffusion and thermal conductivity of gas - Experimental verification - Vander walls equation of state - Determination of Vander walls constant - Relation between Vander Wall's constant and critical constants.

UNIT - V: Thermodynamics **(18 Hours)**

Zeroth and first law of thermodynamics – Reversible and irreversible processes – Isothermal process - Adiabatic process - Gas equation during adiabatic process - Work done during adiabatic and isothermal process - second law of thermodynamics – Carnot's engine – Efficiency - Entropy – Change of entropy in reversible and irreversible processes – Temperature – Entropy diagrams - Third law of thermodynamics – Maxwell thermodynamical relations - Clausius - Clapeyron equation.

TEXT BOOKS:

1. Heat and Thermodynamics – Brijlal and Subramanyam, S.Chand & Co, 16th Edition New Delhi, 2005.
2. Heat and Thermodynamics – D.S. Mathur, Sultan Chand & Sons, 5th Edition, New Delhi, 2014.
3. Thermal Physics – R. Murughesan and Kiruthiga Sivaprasath, S.Chand & Co, 2nd Edition, New Delhi, 2008

BOOKS FOR REFERENCE:

1. Heat & Thermodynamics – J.B. Rajan, SC Publisher, New Delhi, 1985.
2. Concepts of Physics Volume I and II – H.C. Varma, Bharati Bhawan Publishers, New Delhi, 2015.
3. M. Narayanamoorthy and N. Nagarathinam, Heat, National publishing Co, Chennai, 8th Edition, 1987.

HEAT AND THERMODYNAMICS – PRACTICAL
COURSE CODE : 23UPHC22

SEMESTER - II	CORE – P2	HOURS – 2	CREDITS – 3	TOTAL HOURS : 30

COURSE OBJECTIVES :

Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

1. Determination of Specific heat by cooling – Graphical method.
2. Determination of Thermal conductivity of bad conductor by Lee's disc method.
3. Determination of Specific heat capacity of solid.
4. Determination of Stefan's constant for Black body radiation.
5. Verification of Stefan's - Boltzmann law.
6. Determination of Thermal conductivity of rubber tube.
7. Newton's law of cooling – verification
8. Determination of Emissivity of a surface
9. Specific heat capacity of a liquid
10. Specific heat capacity by the method of mixture

ALLIED: MATHEMATICS – II

(FOR PHYSICS)

(Course Code: 23UMTE21)

Semester – II	EC - 2	Hours - 6	Credits – 5

Course Outcomes: By the end of the course the students will be able to

- **CO 1.** Discuss the concept of vector differentiation and vector Integration.(K2)
- **CO 2.** Discuss Fourier series. (K2)
- **CO 3.** Calculate Line, surface and volume integrals using Green, Gauss and Stoke's theorem.(K3)
- **CO 4.** Determine partial differential equations and solve the first order partial differential equations.(K3)
- **CO 5.** Illustrate solenoidal and irrotational functions.(K4)
- **CO 6.** Solve the differential equations with constant coefficients and homogeneous linear equations.(K5)

Unit I:

Vector algebra - Differentiation of vectors - Gradient - Divergence and Curl

(Text book 1: Chapter 5)

Unit II:

Line integrals - Surface integrals - Theorems of Green - Gauss and Stokes

(Text book 1: Chapter 7)

Unit III:

Fourier series - Definition - The Cosine and Sine series

(Text book 2: Chapter 3)

Unit IV:

Linear equation with constant coefficients - Methods of finding complementary functions - Methods of finding particular integrals - Homogeneous linear equations

(Text book 2: Chapter 5: Sections 1- 4)

Unit V:

Formation of partial differential equations - First order partial differential equations - Methods of solving first order partial differential equations - Some standard forms

(**Text book 2: Chapter 6)**

Text books:

1. S. Arumugam and Issac, Allied Mathematics paper II, New Gamma Publishing House, 2003.

S. Arumugam and Issac, Allied Mathematics paper III, New Gamma Publishing House, 2004.

NON MAJOR ELECTIVE
NUCLEAR ENERGY AND ITS APPLICATIONS
(COURSE CODE: 23UPHN21)
(For students of other Major)

SEMESTER - II	SEC- 2	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Know about the large scale demand of energy for meeting day to day domestic, and industrial requirements. K2

CO2 : Analyse the differences between nuclear fission and nuclear fusion. –K4

CO3 : Understand the functioning of various nuclear reactors in india. – K2

CO4 : Understand the advantages of nuclear energy – K1

CO5 : Create an awareness about nuclear treaty – K6

Unit - I: Nuclear Energy **(10 Hours)**

Introduction – Atomic structure – Chain reaction – Nuclear fusion - Atom bomb – Nuclear fission - Hydrogen bomb – Nuclear reactors – Stellar energy – Nuclear energy – Nuclear fuel – Applications of nuclear physics in Archeology.

Unit - II: Reactors **(10 Hours)**

Types of reactors in Tamil Nadu – Koodankulam Nuclear reactor – Reactors in India – Breeder reactor – Uranium ore – sources in India – Advantages and disadvantages – Advantages and Disadvantages of Nuclear energy - Chernobyl disaster – Nuclear hazards.

Unit - III: Nuclear Treaty **(10 Hours)**

Nuclear treaty – Hyde Act – Indo-American agreement of nuclear treaty.

TEXT BOOKS:

1. R.Murugesan - Modern Physics, S. Chand and Company, Edition, 2010.
2. Irwing Kaplan - Nuclear Physics, Narosa Publishing House, Edition 2002.

ELECTRICITY AND MAGNETISM
(COURSE CODE: 23 UPHC31)

SEMESTER - III	CORE – T3	HOURS – 6	CREDITS – 5	TOTAL HOURS : 90

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Remember the physical aspects on electricity and magnetism and to apply the principles in day today life. (K1)

CO2 : Learn the concept of charges and how they interact with each other

CO3 : Apply knowledge of electricity and magnetism to explain natural physical processes and related technology advances (K3)

CO4 : To solve a range of different problems in electricity and magnetism (K5)

CO5 : Have a basic exposure and grasp on how experimental equipments related to electricity and magnetism can be used (K3)

CO6 : Analyse the basic concept and the properties of elements in AC circuits and their applications. (K4)

UNIT - I Electric Field **(18 Hours)**

Coulombs law in vector form - Electric field - Electric field due to a point charge - Electric dipole - Electric field due to an electric dipole at an axial point, a point on the equatorial line - Electric lines of force - Gauss law – proof - applications – Field due to (i) uniformly charged non conducting sphere and (ii) uniformly charged conducting sphere

UNIT - II (A) Electric potential **(18 Hours)**

Electric potential – Potential difference - relation between electric field and electric potential equipotential surface - Potential at a point due to (i) point charge (ii) uniformly charged non-conducting sphere - Electrical potential energy.

(B) Capacitors

Principle of capacitor - Spherical capacitor – cylindrical capacitor - Capacitance of parallel plate capacitor – effect of dielectrics in capacitors - Capacitors in series and parallel – Energy stored in a charged capacitor - Loss of energy on sharing of charges between two capacitors.

UNIT - III AC circuits **(18 Hours)**

Alternating current: Emf induced in a coil rotating in a magnetic field - Peak value - Mean value - Effective value - Impedance - AC circuits: circuit containing L and R in series - LCR series resonance circuit - LCR parallel resonance circuit. Transient current: Growth and decay of current in LR circuit - Growth and decay of charge in LCR circuit - Measurement of high resistance by leakage.

UNIT - IV (A) Magnetic effect of electric current **(18 Hours)**

Biot-Savart law - Magnetic induction at a point due to a straight conductor carrying current - Force on a current carrying conductor in a magnetic field - Force between two parallel current carrying conductors - Torque on a current loop in a uniform magnetic field - Moving coil ballistic galvanometer - Current and Voltage sensitivities of a moving coil galvanometer - Determination of capacity of a capacitor.

(B) Electromagnetic induction

Self inductance - Self inductance of a long solenoid - Owen's bridge - Mutual inductance - Determination of mutual inductance - Coefficient of coupling.

UNIT - V Magnetic properties of materials (18 Hours)

Classification of magnetic materials - Magnetic induction - Magnetization - relation between B, H & M – Magnetic susceptibility and permeability - Electron theory of dia, para and ferromagnetism - Langevin's theory of diamagnetism and paramagnetism - Failures of Langevin's theory - Weiss theory of ferromagnetism.

TEXT BOOKS:

1. Murugesan R. - Electricity and Magnetism, S. Chand and Company Ltd. Edition 10th Revised Edition, 2017.
2. Brijilal and Subramaniyan - Electricity and Magnetism, S. Chand and Company Ltd.,Reprint 2009.

REFERENCE BOOKS:

1. S.G. Starling - Electricity and Magnetism, Longmann Green 8th Edition 2000.
2. Chakraborty - Electricity & Magnetism, New Age International, 2008.
3. N.K. Sehgal & Chopra - Electricity & magnetism, Sultan Chand & Sons, 2nd Edition, 2000.

PRACTICAL - ELECTRICITY AND MAGNETISM
COURSE CODE: 23UPHC32

SEMESTER - III	CORE – P3	HOURS – 2	CREDITS – 3	TOTAL HOURS : 30

1. Figure of merit – Spot galvanometer.
2. Thermo emf Determination – Spot galvanometer.
3. Self inductance – Maxwell's bridge.
4. Self inductance – Owen's bridge.
5. Comparison of Capacitance – De Sauty's bridge
6. Calibration of low range Voltmeter – Potentiometer.
7. LCR series resonance circuit
8. LCR parallel resonance circuit.
9. Absolute capacity of a capacitor.
10. High resistance by leakage.

NON MAJOR ELECTIVE
SPACE SCIENCE AND COSMOLOGY
(COURSE CODE: 23UPHN31)

SEMESTER - III	SEC - 5	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

COURSE OUTCOMES: At the end of the course the students will be able to
CO1 : To understand the solar atmosphere and its effect on earth
CO2 : To understand the origin and evolution of the universe.
CO3 : To explore the space missions to moon and other planets
CO4 : To learn the basic information about the formation and the classification of stars
CO5 : To learn the formation of black holes and their properties.

UNIT - I **(6 Hours)**

Velocity – acceleration– Newton's law of gravitation – acceleration due to gravity – gravity near the earth's surface – above the earth's surface – below the earth's surface.

UNIT - II **(6 Hours)**

Equator – prime meridian – latitude – longitude – escape velocity – light year – Kepler's laws – Earth's atmosphere and its composition.

UNIT - III **(6 Hours)**

Geostationary orbit - geosynchronous orbit – artificial satellites - space missions of ISRO, NASA and ESA.

UNIT - IV **(6 Hours)**

Big-bang theory – Hubble's law - discovery of Higg's boson - planets - satellites – meteors – asteroids – comets.

UNIT - V **(6 Hours)**

Solar system – Galaxy – milky way galaxy – evolution and death of stars - black hole – gravitational waves.

TEXT BOOKS:

1. Arnab Rai Chaudhuri – Astrophysics for Physicists, Cambridge University Press, Reprint 2012.

REFERENCE BOOKS:

1. Baidyanath Basu – An introduction to Astrophysics, Prentice Hall of India Pvt. Ltd., 2nd Edition, 2012.
2. Cesare Emiliani – Planet Earth, Canbridge University Press, 1997.
3. William Lowrie – Fundamentals of geophysics, Canbridge University Press, 1997.
4. Encyclopedia Brittanica for space.

ALLIED CHEMISTRY- I (FOR PHYSICS)

SUBJECT CODE: 23UCHE31

Semester: III	EC-T3	Credits : 3	Hours / W : 4

On completion of the course the students should be able to

CO 1 : Understand the atomic structure and periodicity(K1)

CO 2 : Appreciate the mistery of existence of atoms together in molecular form(K2)

CO 3 : Enjoy the regularity in solids(K3)

CO 4 : Use different acids and bases for biological applications and evaluate redox processes.(K5)

CO 5 : Use practical knowledge for Industrial backgrounds. (K4)

UNIT I Atomic Structure and Periodic Table **12 Hrs**

Bohr model of atom- Atomic spectrum of hydrogen and Bohr theory - Refinement of the Bohr theory- Duel nature of electrons particles or waves- Quantum numbers and its significance- Uncertainty principle- Paul's exclusion principle, Hund's rule- Periodic table-Modern periodic table- Long form of periodic table- Division of elements into s,p,d and f blocks-Bohr's aufbau principle electronic configuration of ground state of atoms up to K(Z=19)-Trends in atomic properties Ionization energy, successive ionization energy , electron affinity, electro negativity Pauling, Mulliken and Allred Rochow's scale

Self study: Fundamentals of atomic structure, atomic number, mass number

UNIT II Structural and Chemical Bonding **12 hrs**

Types of chemical bond - Electrovalent bond (conditions for formation and associated properties)- Covalent bond (conditions for formation and associated properties)- Coordinate covalent bond- Orbital overlap ss, sp, pp overlap- Sigma and pi bond formation of N_2 and O_2 properties- Polar and non-polar molecules- Dipole moment and its applications- VSPER theory application to CH_4 , NH_3 and H_2O - Molecular orbital theory, bonding, antibonding and non-bonding orbitals- MO diagrams for H_2 , He_2 , N_2 and O_2 bond order

Self study: Ionic bond, covalent bond, Coordinate bond

UNIT III Solid State and Energetics **12 hrs**

Macroscopic properties of solids- Types of characteristics of crystals- Covalent solids structure and properties of diamond and graphite- Ionic crystals solid NaCl- Metallic crystals- Molecular crystals intermolecular forces- Metals - free electron theory and band theory of metallic bond- Superconductors- Lattice energy- Born Haber cycle- Law of conversation of energy- Enthalpy of reactions- Entropy and Gibbs energy- Relationship between Gibbs energy and equilibrium.

Self Study: Difference between crystalline and amorphous substances

UNIT IV Acid, Bases and Redox Processes **12 hrs**

Concept of acids and bases- Arrhenius concept- Bronsted Lowry concept conjugate acids and bases- Lewis concept- Effect of solvents and substituents on relative strengths of acids and bases- Hydrolysis- Ionization of water- pH scale definition of pOH , pK_a, pK_b simple numerical problem- Buffer solution - Redox processes- Electronic concept of oxidation and reduction- Oxidation number rules- Calculation of oxidation number of elements in neutral molecules and in ions- Balancing ionic equation by oxidation number method.

Self Study: Ideas on acids, bases and salts

UNIT V Practical Chemistry-I: Qualitative Analysis **12 hrs**

Introduction acquaintance with chemical laboratory laboratory equipments solid reagents, liquid reagents and test papers laboratory instructions and some don'ts Bunsen burner (self study) - Chemistry involved in the analysis of anion and cations - Dry tests (action of heat, flame test, filter ash test) -Wet test (with acids , with Na_2CO_3 extract)- Elimination of interfering anions and preparation of original solutions-Classification of cations into analytical groups- Condition for precipitation, application of solubility product and common ion effect in qualitative analysis- Safety in laboratory- General safety measures (safety equipment, safety notices, personal protection, dangers to avoid)- Chemical hazards (corrosive, irritant substances, toxic compounds, flammable explosives)- Physical hazards (fire, pressure) fire extinguisher- Spillage and waste disposal- First aid (immediate assistance, burns, eye injuries, bleeding, toxic materials) first aid kit.

Self Study: Simple salt analysis.

Note: Course materials will be supplied to the students

ALLIED CHEMISTRY PRACTICAL – I (FOR PHYSICS)

Inorganic qualitative analysis

(Subject Code: 23UCHE32)

Semester: III	EC-P4	Credit: 2	Hours/W : 2

On completion of the course the students should be able to

CO 1: Explain and demonstrate the techniques of elimination of interfering radicals (K2)

CO 2: Apply the physical and chemical properties of various ions in the identification if unknown samples (K3)

CO 3 : Categorize the metal ions into different groups. (K3)

CO 4 : Identify the presence of inorganic salts in biological samples. (K4)

CO 5 : Separate ions using common ion effect and solubility product (K5)

CO 6 : Analyze samples using microscale techniques (K4)

Qualitative analysis of a simple salt containing one anion and one cation

ANIONS: Carbonate, Borate, Fluoride, Oxalate and Phosphate

CATIONS: Lead, Bismuth, Copper, Cadmium, Cobalt, Nickel, Manganese, Zinc, Barium, Strontium and Ammonium

Note: Laboratory manual is supplied

OPTICS AND LASERS
(COURSE CODE: 23UPHC41)

SEMESTER - IV CORE – T4 HOURS – 4 CREDITS – 4 TOTAL HOURS : 60

COURSE OUTCOMES: At the end of the course the students will be able to

CO 1 : Gain good knowledge of optics and understand the developments in photonics . (K2)
CO 2 : Exprimenting the various optical instruments (K3)
CO 3 : Analyse the differences between interference, diffraction and polarization (K4)
CO 4 : Highlighting the basic concepts in lasers (K1)
CO 5 : Articulate the camera, size and resolution power (k3)

UNIT - I: Optical Instruments (12 Hours)

Eye - Camera – Size of an object – The simple magnifier – Com pound Microscope – Refracting astronomical telescope – Compound microscope – Resolving Power - Rayleigh's criterion of resolution - Resolving power of a telescope and prism- constant deviation spectroscope.

UNIT - II : Interference of Light (12 Hours)

Young's Double – slit Experiment – Optical Path Difference between the waves – Fresnel biprism - Experimental arrangement – Determination of wavelength of light - Interference Fringes with white light – Lateral displacement of fringes – Haidinger's fringes – air wedge theory and experiment - Colours of thin films – Newton's Rings – Determination of wavelength of light – Refractive index of a liquid - Michelson's interferometer – Applications of Michelson's Interferometer.

UNIT - III: Diffraction (12 Hours)

Introduction - Zone plate – Diffraction due to anarrow slit - Fraunhoffer diffraction at double slit - Theory of plane transmission grating - Oblique incidence - Absent spectra with a diffraction grating - Determination of wavelength of a spectral line using the transmission grating - Dispersive power of grating.

UNIT - IV: Polarization (12 Hours)

Introduction - Polarization by double refraction – Fabrication of linear polarizer - Nicol Prism – Polaroid sheets - Huygen's explanation of double refraction – Types of polarized light - Quarter wave plate - Half wave plate - Production and detection of plane, elliptically and circularly polarized light - Babinet compensator – Double image polarizing prisms - Optical activity - Fresnel's explanation of optical rotation - Laurent's halfshade polarimeter – application - LCD.

UNIT - V: Lasers (12Hours)

Introduction - Einstein relations (no derivations) - Light Amplification - Population inversion – properties of laser - Components of Laser: Active medium – Pumping - optical resonant cavity – Principal pumping schemes - Ruby laser – Helium-neon laser – Carbon dioxide laser - Laser

beam characteristics – Applications - fibre optics – introduction - types of fibre - numerical aperture and acceptance angle.

TEXT BOOK:

N. Subrahmanyam, Brijlal & M.N. Avadhanulu - A Textbook of Optics, S. Chand & Company Ltd,New Delhi, Twenty Fourth Revised Edition, 2010.

REFERENCE BOOKS:

1. Anchal Srivastava, R.K. Shukla - Optics, S. Chand & Com. 2000.
2. R. Murugesan - Optics and Spectroscopy, S. Chand & Com. 2010.
3. A.B. Gupta - Modern Optics, Books and Allied (P) 2010.
4. K. John Robertson - Introduction to Optics, D van Nostrand Company IV, 2000.
5. Khanna & Gulati - Fundamental of Optics, R. Chand & Com V, 2000.
6. Francis Jenkins and Harvey E. White - Fundamentals of Optics, Tata McGraw-Hill , Edition, Fourth Edition, 2011.
7. S.P.Singh, J.P.Agarwal, Optics, Pragathi Prakashan, 2003.

PRACTICALS (OPTICS and LASERS)
(COURSE CODE: 23UPHC42)

SEMESTER - IV	CORE – P4	HOURS – 2	CREDITS – 3	TOTAL HOURS : 30

1. Dispersive power of a prism using spectrometer.
2. Grating – Normal incidence using spectrometer.
3. Grating – Oblique incidence using spectrometer.
4. Air wedge - Thickness of insulation.
5. Newton's Rings
6. Effective focal length of lenses in contact.
7. Effective focal length of lenses(two thin convex lenses) out of contact.
8. Effective focal length of lenses (one convex and other concave) out of contact.
9. Polarimeter
10. Optic bench

SKILLED BASED ELECTIVE

ELECTRONICS IN DAILY LIFE

COURSE CODE: 23 UPHN41

SEMESTER - IV	SEC - 6	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Get the hobby constructing electronics circuits.
CO2 : Construct the Logic gates diode rectifiers and simple circuits
CO3 : Know the components like resistances, transistors, capacitors etc.
CO4 : Construct the circuits in printed board circuits.
CO5 : After completing the course the students are allowed to carry their circuits to their houses. Fabrication of printed circuit boards for different electronics circuits is also possible.

Experiments

1. Identification of resistance value using colour codes –
2. Verification of truth tables (AND, OR, NOT, NAND & NOR gates) –
3. Boolean algebra –
4. DC value measurement using diode rectifier
5. Construction of hobby circuits

ALLIED CHEMISTRY- II (FOR PHYSICS)
SUBJECT CODE: 23UCHE41

Semester: IV	EC-T4	Credits : 3	Hours / W : 3

On completion of the course the students should be able to

CO 1 : Write the nomenclature of organic compounds.(K2)
CO 2: Develop the knowledge in the area of electromotive force(K1)
CO 3 : Use various processes involved in metallurgy for industrial applications(K5)
CO 4 : Know the application of chemistry in industries(K3)
CO 5 : Develop the practical knowledge in volumetric analysis.(K2)

UNIT I Fundamentals of Organic Chemistry **9 hrs**

Hybridization- Need for the concept of hybridization- sp, sp^2 and sp^3 hybridization with suitable examples- Isomerism in organic compounds- Structural isomerism types with example- Stereoisomerism conformational, geometrical and optical isomerism- Geometrical isomerism cis and trans nomenclature- Optical isomerism elemental of symmetry chirality optical activityenantiomers, diastereomers,mesomer and racemic mixture optical activity exhibited by lactic acid and tartaric acid.

Self study: Fundamentals of isomerism and hydridization.

UNIT II Electromotive Force **9 hrs**

Introduction- Requirements of an electrochemical change- Electrochemical cells difference between electrolytic and galvanic cells- Salt bridge- Electrode potential and standard electrode potential- Electrochemical series and applications- Conventions used in electrode representation and in cell representation- Types of electrodes description of hydrogen, calomel and glass electrodes Nernst equation- Weston cadmium cell- Experimental determination of a cell emf and determination of electrode potential simple calculation- Potentiometric titrations and their advantages principle and method of acid base, redox and precipitation titrations- Determination of pH using hydrogen, glass and quinhydrone electrodes

Self study: Electrolysis and galvanic cells

UNIT III Polymers **9 hrs**

Polymers - Properties of polymers ;Mechanical, physical, thermal, optical, electrical and chemical properties- Preparation and uses of thermoplastics polyethylene and PVC- Preparation and uses of thermosetting plastics nylon, epoxy resins, Bakelite- Rubber and uses of rubber- Vulcanization. - Biopolmers.

Self study: Simple extraction procedure

UNIT IV Industrial Chemistry **9 hrs**

Silicones preparation, properties and uses- Manufacture and types of glass- Fuel gases manufacture, composition and uses of producer gas, water gas, LPG and bio Gas- Softening of water: Ion exchange, electro dialysis and reverses osmosis methods – Solubility-Colligative properties-Kb, Kf.. Rast method-molecular properties-polarity-dipole moment- o, p-Nitrophenol, Polarity-boiling point, solubility. hydrogen bonding-origin-applications-Vander Waal's forces.

Self study: Fundamentals of magnetism

UNIT V Practical Chemistry II- Volumetry **9 hrs**

Introduction definition of various terms (titrations, volumetric analysis, titrant indicator, end point requirements of the reaction selected for the titration commom types of titration. Law of equivalence equivalent weight of acids, bases, oxidizing agents, reducing agents and salts calculation of molecular weights and equivalentweights. Requirements of a primary standard - Secondary standards- Numerical problems in the preparation of solutions- Law of normalities preparation of HCl, H_2SO_4, HNO_3 (approximately 0.1N) from standard acids- Principles behind - Acid base titration - pH verses volume curves, choice of indicates form different acid base titrations- Permanganimetry- Dichrometrydiphenylamine and potassium ferricyanide as indicators- Iodimetry Preparation of iodine and starch solutions - starch as indicators- Iodometry role of $KMnO_4$ and $K_2Cr_2O_7$-

Self study: Preparation of solution

Note: Course materials will be supplied to the students

ALLIED CHEMISTRY PRACTICAL – II (FOR PHYSICS)

Inorganic Qualitative Analysis

(Subject Code: 23UCHE42)

Semester: IV	EC-P4	Credit: 2	Hours/W: 2

On completion of the course the students should be able to

CO 1: Explain the basic principles involved in titrimetric analysis.(K2)

CO 2 : Compare the methodologies of different titrimetric analysis.(K3)

CO 3 : Calculate the concentrations of unknown solutions in different ways and develop the skillto estimate the amount of a substance present in a given solution.(K4)

CO 4 : Identify the end point of various titrations.(K5)

S. No	Estimation	Link	Standard
1	Strong Acid	Weak Base/Strong Base	Strong Base
2	Strong Acid	Strong Base	Weak Acid
3	Strong Base	Strong Acid	Weak Base
4	Oxalic acid	Potassium Permanganate	Oxalic acid
5	Ferrous Sulphate	Potassium Permanganate	Ferrous Ammonium Sulphate
6	Potassium dichromate	Ferrous Sulphate	Potassium dichromate
7	Ferrous Ammonium Sulphate	Potassium dichromate	Ferrous Sulphate
8	Potassium Permanganate	Sodium thiosulphate	Potassium dichromate
9	Magnesium Sulphate	EDTA	Zinc Sulphate
10	Zinc Sulphate	EDTA	Magnesium Sulphate

Note: Laboratory manual will be supplied

MECHANICS – (DISCIPLINE SPECIFIC)
(COURSE CODE: 23UPHS42)

SEMESTER - IV	SEC – 7	HOURS – 3	CREDITS – 2	TOTAL HOURS : 45

COURSE OUTCOMES: At the end of the course the students will be able to
CO1 : Understand the various conservation laws in mechanics. (K2)
CO2 : Understand the basic concepts in moment of inertia (K2)
CO3 : Apply the various theories on hydrostatics and hydrodynamics (K3)
CO4 : Solve problems in hydrodynamics and hydrostatics (K6)
CO5 : Define the classical mechanics in detail. (K1)

UNIT – I : Conservation laws (9 Hours)

Work energy theorem - Conservative force - Potentialenergy - Law of conservation of energy – Application of law of conservation of energy - Ballistic pendulum - Two body problem and Reduced mass – Linear momentum – Elastic and Inelastic collision - Direct and Oblique impacts - Loss of kinetic energy due to direct impact between two smooth spheres.

UNIT – II : Moment of Inertia (9 Hours)

Moment of inertia of a rigid body - Radius of Gyration - Theorem of Parallel axes - Theorem of Perpendicular axes - Moment of inertia of a solid cylinder - Moment of inertia of a solid sphere about a diameter - Gyroscope.

UNIT – III : Hydrodynamics (9 Hours)

Introduction – Gradient, Divergence and Curl - Fundamentals of Hydrodynamics - Some important types of fluid flow – Equation of continuity for fluid flow - Euler's Hydro-dynamical Equations of motion.

UNIT – IV : Hydrostatics (9 Hours)

Introduction - Thrust on a plane surface immersed in a liquid at rest – Laws of floatation – Metacentre and stability of floating bodies - Determination of Metacentric height of a Ship - Principle of working of submarine.

UNIT – V : Classical Mechanics (9 Hours)

Mechanics for a System of Particles – Constraints - Generalised Coordinates - Principle of Virtual Work - D'Alemberts Principle – Lagrange's equation for a system containing Dissipative forces - Applications.

TEXT BOOKS:

1. Ubaldraj - Mechanics and Acoustics, Indira Publications, Marthandam, Revised Edition, 2003.
2. Ubaldraj - Mechanics, Indira Publications, Marthandam, 1998.
3. Ubaldraj - Mechanics and Thermal physics, Indira Publications, Marthandam, Revised Edition, 2003.

REFERENCE BOOKS :

1. John Robert Taylor - Classical Mechanics, University Science Books, 2005.
2. T.W.B Kibble, Frank H. Berkshire - Classical mechanics, Imperial College Press,3. 2004.
4. Herbert Goldstein - Classical Mechanics, Addison Wesley Pub.Co, 1980.
5. Goldstein - Classical Mechanics - Third Edition, Pearson Education India, 2002.

ELECTRONICS - I
(COURSE CODE: 23 UPHC51)

SEMESTER - V	CORE –T5	HOURS – 5	CREDITS – 4	TOTAL HOURS : 75

COURSE OUTCOMES : At the end of the course the students will be able to
CO1 : Understand the working of electronic devices. (K2)
CO2 : Examine these techniques in practical circuits (K3)
CO3 : Execute the skill in handling instruments (K3)
CO4 : Correlating the various characteristics pertaining to diodes and its applications (K4)
CO5 : Understand the various biasing techniques. (K2)

UNIT I: Diode Characteristics (15 Hours)

Constant voltage source - constant current source - Maximum power transfer theorem - Norton's Theorem - Thevenine's theorem - V-I characteristics of a PN junction diode - half wave rectifier - full wave rectifier - bridge rectifier - calculations of dc current, r.m.s value of current, rectifier efficiency, ripple factor in each case - Filter circuits - Types of filter circuits.

UNIT II: Diode Applications (15 Hours)

Zener diode - Equivalent circuit - Zener diode as voltage stabilizer – LED - V-I characteristics – advantages - applications - photo diode - characteristics - applications - clipping and clamping circuits - differentiator and integrator using passive elements - Tunnel diode - Oscillator - Varacator diode - Applications of Varacator diode - Shockley diode.

UNIT III: Transistor Characteristics and Biasing Techniques (15 Hours)

Junction transistor - working of a transistor – transistor action - transistor characteristics - CB, CE, CC - comparison between the three configurations - Alpha and beta of a transistor - operating point – Faithful amplification - transistor biasing – stabilization - need for stabilization - stability factor - requirements of a biasing circuit - voltage divider biasing circuit

UNIT IV: Single stage, Multistage and Power Amplifiers (15 Hours)

Single stage transistor amplifier - classification of amplifiers - analyzing an amplifier - graphical method - equivalent circuit method - gain of a multistage amplifier - RC coupled amplifier - transformer coupling - direct coupled amplifier - comparison - frequency response curve of an RC coupled amplifier - classification of power amplifiers

UNIT V: FET and UJT Characteristics (15 Hours)

FET- the junction field - effect transistor - working principles of JFET – characteristics - advantages - The MOS field effect transistor - circuit characteristics of the FET- types of MOSFET- UJT - Construction – operation - equivalent circuit – characteristics - UJT as relaxation oscillator-over voltage detector.

TEXT BOOKS:

1. V.K.Mehta - Principles of electronics, S. Chand & Co Reprints 2010
2. Bhargava N.N, Kulshreshtha D.C and S.C Gupta - Basic electronics and linear circuits, Tata McGraw Hill Publishing Company Limited, 2007.
3. Milmann and Halkias – integrated electronics, Tata McGraw Hill-43rd reprint 2007

REFERENCE BOOKS:

1. John D. Ryder - Electronics fundamentals and applications, PHI V Edition 1999.
2. Albert Paul Malvino - Electronic principles, Tata McGraw Hill - 6th Edition.
3. N.N.Bhargava, D. Kulshrashtha & G. Gupta - Basic electronics and linear circuits, Tata McGraw Hill.

PRACTICAL – ELECTRONICS - I

COURSE CODE : 23UPHC55

SEMESTER - V	CORE – P5	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Transistor characteristics - CE configuration.
2. Transistor characteristics - CB configuration.
3. Clipping circuits.
4. Differentiator and integrator.
5. Construction of Bridge rectifier.
6. FET characteristics.
7. UJT characteristics.
8. Construction of full wave rectifier.
9. SCR - Characteristics.
10. UJT relaxation oscillator.

QUANTUM MECHANICS AND RELATIVITY
(COURSE CODE: 23UPHC52)

SEMESTER - V	CORE – T6	HOURS – 5	CREDITS – 3	TOTAL HOURS : 75

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Understand the postulates of quantum mechanics and capable of solving one dimensional transmission and reflection problems.

CO2 : Understand De-broglie wavelength and the matter waves.

CO3 : Solve schrodinger time dependent and time independent equations

CO4 : Solve the various problems pertaining to hydrogen atom and rigid rotor

CO5 : Understand the differences between general and special theory of relativity.

UNIT I : Matter waves **(15 Hours)**

The de Broglie wavelength – G.P. Thompson's experiment – expression for group velocity – relation between group velocity and wave velocity – Experimental study of matter waves – Davisson and Germer's experiment – Compton effect.

UNIT II : Uncertainty Principle **(15Hours)**

Heisenberg's uncertainty principle – Determination of position with X - ray microscope – Diffraction of a beam of electrons by a slit – Complementary principle of Bohr – wave mechanical atom model – the particle in a box – Mathematical proof of uncertainty principle for one dimensional wave-packet – basic postulates of quantum mechanics.

UNIT III : Schrodinger Equations and their Applications **(15 Hours)**

Schrodinger time - dependent equation – Schrodinger time - independent (steady state) equation – Properties of the wave function – particle in a one - dimensional box – Potential step – the barrier penetration problem – Linear harmonic oscillator – the hydrogen atom – the rigid rotator.

UNIT IV : Relativity **(15 Hours)**

Relativity – frame of reference – Galilean transformation equations – the Michelson-Morley experiment – postulates of special theory of relativity – the Lorentz transformation equations - length contraction – time-dilation – the twin paradox – Relativity of simultaneity.

UNIT V : Mass, Energy and General Theory of Relativity **(15 Hours)**

Addition of velocities – variation of mass with velocity – mass energy equivalence – Minkowski's four dimensional space - time continuum – the general theory of relativity.

TEXT BOOKS:

1. R. Murugeshan and Kirthuthiga Sivaprakash - Modern Physics, Chand & company, 12th Revised Edition, 2. 2005.
2. Mathews and Venkatesan, 1976, A Text book of Quantum Mechanics McGraw – Hill Higher Education

REFERENCE BOOKS:

1. S. P. Singh and M. K. Bagde - Quantum Mechanics, S. Chand & Co., Edition 1998-1999.
2. Kumar and Sharma - Quantum Mechanics, Jai Prakash Nath & Co., 5th Ed 2000.
3. Seighal and Chopra - Quantum Mechanics, Seeman Pathipagam, Ed 2000.
4. Arthur Beiser - Quantum Mechanics, Tata McGraw Hill, Ed 2010.
5. A. K. Saxena - Quantum Mechanics, Narosa Publishing House, 2002.
6. D. S. Mathur - Mechanics, S. Chand & Co., Ed 2009.

DIGITAL PRINCIPLES
(COURSE CODE: 23UPHC53)

SEMESTER - V	CORE – T7	HOURS – 4	CREDITS – 3	TOTAL HOURS : 60

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Understand the basic tool for the design of digital circuits and the hardware side of computers. (K1)

CO2 : Analyse the basic concepts in arithmetic circuits (K4)

CO3 : Compare the difference between half subtractor and full subtractor (K5)

CO4 : Explain the various functions of flip flops and registers (K2)

CO5 : Describe the functions of registers and counters. (K1)

UNIT – I Arithmetic Circuits (12 Hours)

Binary, Octal and Hexadecimal number system - Boolean algebra – Verification of Boolean relations – Sum of product circuits - Product of sum circuits - Karnaugh map simplification – Binary addition – Binary subtraction – 1's & 2's Complement representation - Arithmetic – operations - Half adder – Full adder – Half subtractor – Full subtractor, Logic gates.

UNIT – II Data Processing Circuits (12 Hours)

16 to 1 Multiplexer – 1 to 16 Demultiplexer – 1 of 16 Decoder – BCD to Decimal decoder – Seven segment display – Encoder – Decimal to BCD encoder – Parity checker – Parity generation – ROM using diodes - PAL.

UNIT – III Flip Flops (12 Hours)

555 Timer – Astable and Monostable multivibrators – Flip flop – RS Flip flop – Clocked RSflip flop – JK flip flop – JK Master Slave flip flop.

UNIT – IV Registers and Counters (12 Hours)

Registers – Universal gates – Types of registers – Serial in serial out shift register – Parallel in parallel out shift register – Counters – Asynchronous counter (4 bit up - down) - Synchronous counter (4 bit up - down) – BCD ripple counter.

UNIT – V Digital to Analog Conversion (12 Hours)

Introduction – Resistor Divider D/A Counter – Binary Ladder Network D/A Converter – D/A Converter Specifications – Analog to Digital Conversion – A/D Counter – Simultaneous Conversion – Counter Method.

TEXT BOOK:

1. Donald P.Leach, Albert Paul Malvino, Goutam Saha – Digital Principles and Applications, Tata McGraw – Hill, 6th Edition.

BOOKS FOR REFERENCE:

1. Mono Morris – Digital Logic and Computer Design, Prentice Hall, 2000.
2. Virendrakumar – Digital Electronics, New Age International, 2002.
3. Thomas C.Bartee – Digital Computer Fundamentals, Tata McGraw – Hill, 2002.

DIGITAL PRINCIPLES (PRACTICALS)
(COURSE CODE: 23UPHC56)

SEMESTER - V	CORE – P6	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Boolean Relations.
2. Flip-flops.
3. Gates (IC) - Verification of truth tables.
4. De Morgan's theorem - Verification.
5. Half adder and Half subtractor.
6. Full adder and Full subtractor.
7. 16 to 1 Multiplexer.
8. 1 to 16 De Multiplexer.
9. BCD to Decimal decoder.
10. Decimal to BCD encoder.

NUCLEAR PHYSICS
(COURSE CODE: 23UPHC54)

SEMESTER - V CORE – T8 HOURS – 4 CREDITS – 3 TOTAL HOURS : 60

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Learn the basic concepts of physics of the nucleus, nuclear models and nuclear force.

CO2 : Phrase a chronology of some of the major events in nuclear physics.

CO3 : Distinguish between principles and working of different types of particles detectors, counters and accelerators.

CO4 : Analyse the various nuclear reactions and applications of nuclear fission and fusion.

CO5 : Keep up with latest developments and new applications in nuclear physics.

CO6 : Recognize the connection between nuclear physics and other branches of physics.

UNIT - I Introduction to the Nucleus (12 Hours)

Introduction – classification of nuclei – general properties of nucleus– nuclear density – nuclear charge – spin angular momentum – resultant angular momentum – nuclear magnetic dipole moment – binding energy – packing fraction – nuclear stability – theories of nuclear composition – non-existence of electron within the nucleus – nuclear forces – meson theory of nuclear forces – liquid drop model – Weizacker's semi-empirical mass formula - shell model.

UNIT - II Radiation Detectors and Particle Accelerators (12 Hours)

Interaction between energetic particles and matter – ionization chamber – proportional counter – bubble chamber – nuclear emulsion technique – Wilson cloud chamber – linear accelerator– cyclotron – synchrocyclotron – betatron – synchrotron.

UNIT - III Radioactivity (12 Hours)

Determination of e/m of alpha particles – alpha particle disintegration energy – alpha particle spectra – Gamow's theory of alpha decay – e/m of beta particle (Bucher's experiment) – beta ray spectra – magnetic spectrograph – neutrino theory of beta decay – origin of gamma rays – nuclear isomerism – internal conversion – Mossbauer effect – Soddy Fajan's law – half life period – mean life - law of successive disintegration – radioactive dating: age of the earth – biological effects of nuclear radiations.

UNIT - IV Nuclear Reactions (12 Hours)

Discovery of artificial transmutation – Bohr's theory of nuclear disintegration – nuclear reaction – types – Q-value equation – nuclear transmutation by alpha particles, protons, deuterons, neutrons – artificial radioactivity – application of radioisotopes – discovery, basic properties and classification of neutrons – neutron sources – neutron detection – nuclear fission – Bohr and Wheeler's theory – chain reaction – atom bomb – nuclear reactors – nuclear fusion – source of stellar energy - thermonuclear reactions: hydrogen bomb.

UNIT - V Elementary Particles (12 Hours)

Classification of elementary particles – fundamental interactions – strong interaction –

electromagnetic interaction – weak interaction – gravitational interaction – elementary particle quantum numbers – baryon number – lepton number – strangeness number – hyper charge – isospin quantum number – conservation laws and symmetry – quark model –compositions of hadrons - coloured quarks and gluons – charm, bottom and top quarks - three generations of quarks and leptons.

TEXT BOOKS:

1. R. Murugesan and Kiruthiga Sivaprasath – Modern Physics, S.Chand & Company Pvt. Ltd., 17th Revised Edition 2014.
2. Mani H.S. and Mehta (G.K), Introduction to Modern Physics, Affiliated East West Press PVT Ltd.

REFERENCE BOOKS:

1. Goshal, S.N. – Nuclear Physics, S.Chand & Company Pvt. Ltd., Revised Enlarged Edition, 2014.
2. Tayal, D.C. – Nuclear Physics, Himalaya Publishing House, 4th Edition, 2000.
3. Irwing Kaplan – Nuclear Physics, Narosa Publishing House, Edition 2002.
4. Elankovan, K. – Nuclear Physics, MJP Publishers, 2012.

PROGRAMMING WITH C and C++
(COURSE CODE: 23UPHE51)

SEMESTER - V	EC– T5	HOURS – 4	CREDITS – 3	TOTAL HOURS : 60

COURSE OUTCOMES : At the end of the course the students will be able to
CO1 : Know the programming principles of C and C++
CO2 : Know the operators, expressions, and functions in C and C++
CO3 : Understand the OOP concepts
CO4 : Write programs to perform matrix addition sorting
CO5 : Use classes and objects in C++ program

Unit - I : Introduction to C **(12 Hours)**

Introduction to C – character set – constants – variables – data types – declaration of variables – arithmetic operators – relational operators – logical operators – assignment operators – increment and decrement operators – conditional operators – bitwise operators – special operators – arithmetic expressions – evaluation of expressions – procedure of arithmetic operators.

Unit - II : Looping and Arrays **(12 Hours)**

Reading and writing a character – formatted input and output – simple of statement – if-else statement – nesting of if-else statements – the else-if ladder – Switch Case Block – Go To statement – While Loop – Do While Loop – for loop – jumping in loops – break and continue statement-one dimensional array – two dimensional array – initializing arrays – multidimensional arrays.

Unit - III : User Defined Functions **(12 Hours)**

Need for user defined functions – return values and their types – no arguments and no return values – arguments but no return values – arguments with return values – need of pointers – need of structure– definition - structure initialization – arrays of structure – arrays within structures – structure within structure-Union- Definition

Unit - IV : OOP with C++ and functions in C++ **(12 Hours)**

OOP paradigm - Basic concepts of object oriented programming – object oriented languages – what is C++? – Applications of C++ - basic data types (3 types) – user defined data types – derived data types – operators – manipulators – operator overloading – operator precedence - Introductions to Functions - main function – function prototyping – call by reference – return by reference – inline functions – default arguments – constant arguments – function overloading.

Unit - V : Classes and Objects, Console I/O Operations **(12 Hours)**

Specifying a class - Defining member functions-A C++ program with class - Nesting of member functions - Arrays within a class - Arrays of objects. C++ streams - C++ Stream classes - Unformatted I/O Operations – Formatted console I/O operations - Managing output with manipulators.

TEXT BOOKS:

1. E. Balagurusamy - Programming in ANSI C, Tata McGraw Hill, 4th Edition, 2007.
2. E. Balagurusamy - Object oriented program with C++, Tata McGraw Hill, 2nd Edition,2007.

REFERENCE BOOKS:

1. Graham Neill - Learning C++, Tata McGraw-Hill, 2000.
2. D. Ravichandran - Programming with C++, Tata McGraw-Hill, 2000.
3. R. Rajaram - Object Oriented Programming and C++, New Age, 1997.

PRACTICALS - (PROGRAMMING WITH C AND C++)
(COURSE CODE: 23UPHE52)

SEMESTER - V	EC – P5	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. To find the variance and standard deviation.
2. Evaluate sin x with .0001 accuracy.
3. Matrix addition.
4. Arrange the numbers in ascending order
5. Simple interest and compound interest
6. A program with arrays within a class.
7. To find the largest of N numbers
8. A program to manage console I/O operation.
9. Matrix multiplication.
10. Complex numbers manipulation

SOLID STATE PHYSICS
(COURSE CODE : 23UPHC61)

SEMESTER - VI	CORE – T9	HOURS – 4	CREDITS – 3	TOTAL HOURS : 60

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Remember the different bonding and structures of solid materials.
CO2 : Understand the types of crystal systems based on lattice parameters identified using diffraction.
CO3 : Distinguish materials based on electrical conductivity, arrangement of atoms/molecules, etc.,
CO4 : Do quantitative calculations based on established theoretical models to describe the properties of materials.
CO5 : Distinguish between different types of magnetic materials and different kind of magnetism manifested in materials.
CO6 : Account for the links between solid state physics and other fundamental branches of physics.

UNIT - I Bonding in solids (12 Hours)

Interatomic forces – bonding - primary bonds - ionic bond - cohesive energy of ionic crystals - covalent bond - metallic bond – secondary bonds - molecular bond - Vanderwaals bond – hydrogen bond - dipole bond.

UNIT - II Crystallography (12 Hours)

Lattice points, space lattice, basis and crystal structure – unit cell and primitive cell - lattice parameters – Bravice lattices and crystal systems – lattice planes and Miller indices – inter planar spacing – packing fraction – simple cubic structure, body centered cubic structure, face centered cubic structure, hexagonal close packed structure, diamond structure, Zinc Blende structure, Sodium chloride structure, Cesium chloride structure.

UNIT - III Semiconductors (12 Hours)

Types of semiconductors – intrinsic and extrinsic semiconductors – Fermi level in intrinsic and extrinsic semiconductors – variation of Fermi level with temperature – carrier concentration in intrinsic semiconductors - carrier concentration in n-type and p-type semiconductors – band gap – direct and indirect band gap semiconductors – Hall effect - semiconducting materials.

UNIT - IV Dielectrics (12 Hours)

Fundamental definitions – dielectric constant – polarizability – polarization – electronic polarization – ionic polarisation - orientational polarisation – space -charge polarization – frequency and temperature effects on polarization – local field or internal field – Clausius-Mossotti relation – applications of dielectric/insulating materials - solid dielectric materials – liquid dielectric materials.

UNIT - V Superconductors (12 Hours)

Superconductivity – properties of superconductors – Meissner effect – effect of magnetic field - heat capacity – critical current - isotope effect – London penetration depth – type I and type II superconductors – BCS theory– applications - magnetic levitation – SQUID – AC and DC

Josephson effect (qualitative explanation) – superconducting materials.

TEXT BOOKS:

1. M. Arumugam – Solid State Physics, Anuradha Publications, 2nd Edition 2009, (Units I -IV).
2. S.O.Pillai - Solid State Physics, New Age International Publishers, 60th Edition 2008 (Unit V).

REFERENCE BOOKS:

1. K. Elangovan - Solid State Physics, MJP Publishers, 2013.
2. Arun Kumar - Solid State Physics, PHI Learning Pvt. Ltd., 2010.
3. M.A.Wahab - Solid State Physics, Narosa Publishing House, 2nd Edition, 2010.
4. R.K.Puri and V.K.Babbar – Solid State Physics, S.Chand & Company Ltd., 2004.

NANO PHYSICS
COURSE CODE: 23UPHC62

SEMESTER - VI	CORE– T10	HOURS – 4	CREDITS – 3
TOTAL HOURS : 60			

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Understand the basic concepts in nano particles and crystal

CO2 : Understand the properties of measuring the properties.

CO3 : Understand the various functions of transmission and scanning electron microscope

CO4 : Understand the various carbon nanostructures

CO5 : Understand the effects of nanotechnology and its environment.

Unit - I : Introduction to the physics of the solid state (12 Hours)

Introduction – Atomic structure – crystallography – insulators ,semiconductors and conductors - donors, acceptors and deep traps – mobility - excitons - reciprocal space - Fermi surfaces.

Unit - II : Properties of individual Nanoparticles and measuring Techniques (12 Hours)

Introduction – Metal Nanoclusters – Magic numbers – Theoretical modeling of Nanoparticles – geometric structure – electronic structure – bulk to Nano transition – particle size determination – Transmission Electron Microscopy – Field Ion Microscopy – Scanning Electron Microscope - Dynamic light scattering - Infrared surface spectroscopy - Raman spectroscopy - Photoluminescence.

Unit - III Semiconducting Nanoparticles (12 Hours)

Semiconducting Nanoparticles – optical properties – methods of synthesis – RF plasma – chemical methods – thermolysis – pulsed laser methods.

Unit - IV Carbon Nanostructures (12 Hours)

Introduction – carbon clusters – small carbon clusters – discovery of C_{60} – superconductivityin C_{60} – larger and smaller fullerenes – carbon nanotubes– fabrication – structure – electrical properties – vibrational properties – mechanical properties – applications of carbon nanotubes – field emission an shielding – computers – fuel cells – chemical sensors.

Unit - V Organic compounds and polymers (12 Hours)

Introduction - forming and characterizing polymers – polymerization – sizes of polymers – nano crystals - condensed ring types – polydiacetylene types – polymers. – conductive polymers - block copolymers.

TEXT BOOKS:

1. Charles P. Poole and Frank J. Owens - Introduction to Nanotechnology (Unit I – IV),John Wiley & sons (Asia) Pvt. Ltd. Reprint 2007.
2. Dr. Shalini Suri - Nanotechnology – Basic Science to Emerging Technology, (Unit V),APH Publishing Corporation, New Delhi, 2006.
3. Nano: The Essentials book by T. Pradeep McGraw-Hill Education.

REFERENCE BOOKS:

1. Michael J. O'Connell - Carbon Nanotubes: Properties and Applications, CRC/Taylor & Francis, 2006.
2. Poorvi Dutta & Sushmita Gupta - Understanding of Nano Science and Technology, Global Vision Publishing House, 2006.
3. Martin V. Berg - Frontal Nanotechnology Research, Nova Science Publishers, 2007.

ELECTRONICS - II
(COURSE CODE: 23UPHC63)

SEMESTER - VI	CORE– T11	HOURS – 4	CREDITS – 2
TOTAL HOURS : 60			

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Attain a sound understanding of the principles of electronics. It enhances the designingcapability of the learner. (K2)

CO2 : Identifying the different electric parameters and units used and also the different types of poweramplifiers (K1)

CO3 : Understand the feedbacks in amplifiers (K2)

CO4 : Determining the functions of operational amplifiers (K3)

CO5 : Exprimenting the construction and working of oscillators. (K4)

UNIT - I Feedback Amplifiers (12 Hours)

Feed back in amplifiers - gain with negative feedback - gain stability by negative feedback - reduction of non linear distortion - effect of feedback on output resistance - effect of feedback on input resistance - voltage series feedback(emitter follower) -current series feedback - differential amplifier - differential mode gain - common mode gain-CMRR.

Unit - II Operational Amplifiers (12 Hours)

Op.amp - ideal characteristics - op.amp as inverting amplifier - virtual ground - non inverting amplifiers - input offset voltage - input offset current - slew rate - op.amps sign changer - scale changer - averaging amplifier – subtractor - differentiator-integrator - comparator - logarithmic amplifier - solving differential equations

Unit - III Oscillators (12 Hours)

Oscillators - barkhausen criterion for oscillation - positive feedback amplifier as an oscillator - Tuned collector oscillator - Hartley oscillator - Colpitt's oscillator - RC phase shift oscillator - piezo electric effect - piezo electric crystals - crystal oscillator.

Unit - IV SCR Characteristics and Applications (12 Hours)

SCR- working of SCR - equivalent circuit of SCR- important terms - V-I characteristics of SCR - SCR in normal operation - SCR as a switch - SCR turn on methods - SCR as half wave rectifier - SCR as full wave rectifier - SCR as over light detector - SCR for power control.

Unit - V Modulation (12 Hours)

Types of modulation - need for modulation - expression for power in AM wave -transistor AM modulator balanced modulator - limitations of AM modulation -frequency modulation - expression for frequency modulated wave – advantages - FM transmitter – demodulation - diode detector.

TEXT BOOKS:

1. V.K.Mehta - Principles of electronics, S. Chand & Co Reprints 2010.
2. Bhargava N.N, Kulshreshtha D.C and S.C Gupta - Basic electronics and linear circuits, Tata McGraw Hill Publishing Company Limited, 2007.
3. Milmann and Halkias – integrated electronics, Tata McGraw Hill - 43rd reprint 2007.

REFERENCE BOOKS:

1. John D. Ryder - Electronics fundamentals and applications, PHI 5th Edition, 1999.
2. Albert Paul Malvino - Electronic principles, Tata McGraw Hill - 6th Edition.
3. N.N.Bhargava, D. Kulshrashtha & G. Gupta - Basic electronics and linear circuits, Tata McGraw Hill.

ELECTRONICS - II (PRACTICALS)
(COURSE CODE: 23UPHC64)

SEMESTER - VI	CORE– P7	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Single stage amplifier without feedback.
2. Two stage amplifier.
3. Emitter follower.
4. Single stage amplifier with feedback.
5. Colpit's oscillator.
6. Hartley oscillator.
7. Op-amp - characteristics
8. Solving simultaneous equation.
9. A/D converter using Op-amp.
10. Op-amp - adder, subtractor, unit gain buffer.

INSTRUMENTATION (PRACTICALS)

(COURSE CODE: 23UPHC65)

SEMESTER - VI	CORE– P8	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Calculation of standard deviation and variance and probable error.
2. Plotting of histogram of a physical quantity.
3. Construction of a multi range dc voltmeter.
4. Construction of series – type ohm meter
5. Construction of shunt – type ohm meter.
6. Calibration of dc ammeter/dc voltmeter
7. Full wave rectifier as ac voltmeter
8. Photo electric Transducer
9. Measurement of voltage & frequency by CRO

MICROPROCESSOR - 8085
(COURSE CODE: 23UPHE61)

SEMESTER - VI	EC – T6	HOURS – 4	CREDITS – 3	TOTAL HOURS : 60

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Understand the microprocessor hardware and software functions.

CO2 : Write programs using Assembly language and describe the purpose of microprocessor internal registers

CO3 : Demonstrate a thorough understanding of programming, implementing programs that search and sort arrays

CO4 : Know the terms applicable to microprocessor, program using Assembly Level Language

CO5 : Understand the different types of interrupts

Unit - I: 8085 Microprocessor Architecture **(12 Hours)**

Introduction - Microprocessors - Microprocessor Instructions Set and Computer Languages - Microprocessor architecture and its operations - Memory - I/O devices- Examples.

Unit - II: Programming the 8085 **(12 Hours)**

Programming the 8085 - Data Transfer operations - Arithmetic operations -Logic operations - Branch operations - Writing assembly language programs - Programming techniques; Looping counting and indexing - Additional data transfer and 16 bit arithmetic instructions - arithmetic operations related to memory - Rotate – Compare Instruction.

Unit - III: Stack and Subroutines **(12 Hours)**

Counters and Time delays - Stack - PUSH and POP instructions - Subroutine - CALL and RETURN instructions - Restart, Conditional CALL and RETURN instructions.

Unit - IV: Code Conversion **(12 Hours)**

BCD to binary conversion – binary to BCD conversion – BCD addition – BCD subtraction – multiplication - Subtraction with carry – Sorting (Ascending, Descending order) - Transfer a block of data - Transfer a block of data in reverse order.

Unit - V: Interrupts **(12 Hours)**

Interrupts - The 8085 interrupt - INTR , INTA & RST instruction - Illustration of 8085 interrupt - Issues in implementing interrupts - multiple interrupts and priorities - 8085 vector interrupts – TRAP - RST 7.5, 6.5 and 5.5 – Interfacing - Name display - Digital clock design - Traffic Signal Display

TEXT BOOK:

1. Ramesh S. Gaonkar - Microprocessor Architecture, Programming and Applications with the 8085., Penram International Publishing (India) Private Ltd, 5th Edition.

REFERENCE BOOKS:

1. Leventhal, Lance A, 8080A/8085 - Assembly Language Programming, Osbrne McGraw -Hill, 2000.
2. Sunil MAthur, Microprocessor 8085 and its interfacing, PHI, 2010.
3. Udaya Kumar.k, Umasankar. B.S., The 8085 Microprocessor Architecture, Pearson Education, 2008.

MICROPROCESSOR - 8085 (PRACTICALS)
(COURSE CODE: 23UPHE62)

SEMESTER - VI	EC – P6	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

ANY TEN EXPERIMENTS:

1. 8-bit addition and 8-bit subtraction
2. Unpacking of packed 8 bit number
3. Multiplication of two 8 bit numbers
4. Division of 8 bit number
5. Addition of N numbers
6. Multibyte Addition & Subtraction
7. Transfer a block of data
8. Transfer a block of data in reverse order
9. Largest of given N numbers
10. Smallest of given N numbers
11. Arranging numbers in a Ascending order
12. Arranging numbers in Descending order
13. Binary to BCD conversion
14. BCD to Binary conversion
15. Generating square wave / Triangular wave
16. Traffic signal display
17. Name display

SKILLS BASED ELECTIVE - PHYSICS FOR COMPETITIVE EXAMS

(PROFESSIONAL COMPETENCY SKILL)

(COURSE CODE : 23UPHS61)

SEMESTER - VI	SEC - 8	HOURS - 2	CREDIT – 1	TOTAL HOURS : 30

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Reflecting their knowledge of fundamentals of physics and thus prepare them for entrance examinations. (K5)

CO2 : Revise the subjects quickly at the time of examinations. (K2)

CO3 : Validate the subject from the elementary level to the required standard level in a simple language. (K5)

CO4 : Understand the various laws of motion. (K2)

CO5 : Deduce between reflection and refraction of light. (K4)

UNIT – I : Mechanics (6 Hours)

Laws of motion – force – momentum – work – energy – circular motion – simple harmonic motion – rigid body rotation – gravitation – Equation of continuity – Bernoulli's principle and applications – velocity of sound.

UNIT – II: Elasticity and Thermodynamics (6 Hours)

Hooke's law – stress, strain – elastic modulus – viscosity - Surface tension – capillary rise of liquids – Osmosis – Diffusion – Carnot cycle - Specific heat of liquids and gases – liquefaction of gases – Conduction - Convection and radiation – Black body radiation.

UNIT – III: Optics (6 Hours)

Reflection of plane surface – Refraction at plane surface and through a prism. defects in images – Interference - Newton's rings, critical angle, optical fibres, Lasers, polarization.

UNIT – IV: Electricity (6 Hours)

Electric potential – Ohm's law – resistor – capacitor – galvanometer - Magnetic elements – electromagnetic induction.

UNIT – V : Atomic physics and Electronics (6 Hours)

Classification of nuclei, properties of nuclei – nuclear radiations – photoelectric effect – chain reaction - nuclear fission and fusion – atom bomb and hydrogen bomb – nuclear reactor - elementary particles – Diode – transistor – logic gates.

BOOKS FOR REFERENCE:

1. N. K. Nayyar – Unique Quintessence of Physics (Ed) for M.Sc.Entrance Examinations, Unique Publishers, New Delhi, 2009.

2. N. K. Nayyar – Unique Quintessence of Physics (Ed) for UPSC /State Civil Services and other Competitive Examinations, Unique Publishers, New Delhi, 2009.

3. M.T. Dharmadhikari, A.Y. Waghale, Vidyadhar Kande-Patil, Himalaya Publishing House, Mumbai, 2006.

EXTRA CREDIT COURSE -1
INTRODUCTION TO SOLAR ENERGY
(COURSE CODE: 23UPHEC1)

COURSE OUTCOMES: At the end of the course the students will be able to

CO1: To outline the technologies used to harness the power of Solar Energy. (K2)
CO2: To get knowledge of the instruments to measure the solar energy. (K2)
CO3: To know the reason why energy sources are effective to commercial, residential and industrial markets. (K5)
CO4: To Defining the principles that underlies the ability of various natural phenomena to deliver solar energy. (K1)
CO5: To Validate the advantages and disadvantages of solar energy. (K5)

Unit - I

Physics of the sun – solar energy – nuclear fission and nuclear fusion – advantages and disadvantages of solar energy.

Unit - II

Black body radiation – solar spectrum – electromagnetic spectrum – conduction – convection – radiation – basic laws of radiation– solar constant – green house effect

Unit - III

Solar radiation on the earth's surface – terrestrial radiation – beam , diffuse and global radiation --Measurement of solar radiation – pyranometer – pyrheliometer – sunshine recorder.

Unit - IV

Semiconductors – n-type and p – type semiconductors – photon interactions with semiconductors – PV cells.

Unit - V

Applications of solar energy – solar cells – solar cooker – solar dryer – solar water heating systems – solar air heating and air-conditioning systems.

TEXTBOOK:

1. G.D.Rai, Solar Energy Utilisation, Khanna Publishers, 5th Edition 2009.

BOOKS FOR REFERENCE:

1. Solar Energy Principles of Thermal Collection and Storage - S.P.Sukhatme , Tata McGraw Hill Publishing Company Ltd., 2nd Edition (1997).
2. Non-Conventional Energy Sources – G.D. Rai, Khanna Publishers – 4th Edition (2008).

EXTRA CREDIT COURSE -2
OPTO ELECTRONICS
(COURSE CODE : 23UPHEC2)

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : To give an introductory account of the basic principles of opto-electronic devices
CO2 : To understand the principle and working of LASER
CO3 : To gain information about fiber optic communication
CO4 : To provide knowledge about semiconducting materials
CO5 : To understand the importance of optical fiber in communication

Unit 1:
Introduction - PN junction as a Light Source (LED) - LED materials Advantages - LCD Characteristics and action of LCD - Advantages.

Unit 2:
Laser - Introduction - characteristics of Laser - Spontaneous and stimulated emission - Einstein coefficients - condition for population inversion - three level scheme - semi conductor.

Unit 3:
Photo detector - characteristics of photo detectors - PN junction photo detector - PIN photo diode - Avalanche photo diode - Photo transistor.

Unit 4:
Introduction principle of optical fiber - light transmission in a optical fiber - Acceptance angle - Numerical aperture.

Unit 5:
Fiber index profiles - Step index, graded fiber (transmission of signals) Advantages of fiber optic communications, optical switching - Logic gates.

TEXT BOOKS:

1. Semiconductor Physics and Optoelectronics - P. K. Palanisamy, SCITECH Publication, Chennai 2002.

2. Optical fibers and Fiber Optic Communication - Sabir Kumar Sarkar IV Revised Edition 2003.

REFERENCE BOOK:

1. Opto Electronics - Wilson & Hawker, Prentice Hall of India 2004.

EXTRA CREDIT COURSE -3
NON-CONVENTIONAL ENERGY SOURCES

(COURSE CODE : 23UPHEC3)

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Get knowledge about the Sun as a source of energy. (K2)
CO2 : Study about solar thermal and photovoltaic devices. (K1)
CO3 : Reflecting the basic concepts of Wind, Bio-mass and Geothermal energy sources. (K4)
CO4 : Identify the various forms of energy utilization concepts. (K1)
CO5 : Analyse the advantages and disadvantages of various forms of energy. (K4)

Unit - I ENERGY SOURCES

Energy sources and their availability –fossil fuels, water power, nuclear energy - non-conventional and renewable energy sources – advantages of renewable energy.

Unit - II SOLAR ENERGY

Introduction – solar constant – physical principles of the conversion of solar radiation into heat– solar pond - photo voltaic principles – PV Cell-applications of solar energy.

Unit - III WIND ENERGY

Introduction **-** power in the wind – basic components of wind energy conversion – classification of wind energy conversion systems (WECS) – advantages and disadvantages of WECS - applications of wind energy.

Unit - IV GEOTHERMAL ENERGY

Introduction – geothermal sources – hydrothermal (convective resources) – advantages and disadvantages of geothermal energy over other energy forms – applications of geothermal energy,

Unit - V BIOMASS AND TIDAL ENERGY

Introduction – biogas generation - biogas plants - Tidal energy – Basic principle of tidal power - advantages and limitations of tidal power generation – Wave - energy conversion devices – Advantages and disadvantages of wave energy.

BOOK FOR STUDY:

1. Non-Conventional energy sources – G.D. Rai, Khanna Publishers – Fourth Edition (2008).

BOOKS FOR REFERENCE:

1. Solar energy utilization - G.D.Rai, Khanna Publishers, Fifth edition (2009).
2. Solar energy principles of thermal collection and storage - S.P.Sukhatme , Tata McGraw HillPublishing company Ltd., Second edition (1997).

EXTRA CREDIT COURSE -4
LASER PHYSICS
(COURSE CODE : 23UPHEC4)

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Study the principle of lasers

CO2 : Understand the different type of laser systems

CO3 : Know about the dynamics of laser systems

CO4 : Analyse the various types of laser effects

CO5 : Get knowledge about the various applications of lasers

UNIT - I BASIC PRINCIPLES OF LASER

Population Inversion – Laser Pumping - A two level system - A three level system - Resonators- vibrational modes of a resonator - No. of modes per unit volume - Open resonators - The confocal resonator - The quality factor Q - The threshold condition - Quantum yield.

UNIT - II SPECIFIC LASER SYSTEMS

Solid state lasers: The Ruby laser - Nd-yag laser - Semiconductor lasers: intrinsic semiconductor lasers - doped semiconductors - condition for laser action - Liquid dye and chemical lasers: liquid lasers- dye lasers - HCL laser - Brommi laser.

UNIT - III DYNAMICS OF THE LASER PROCESSES

Q-Switching - Mechanical shutter - Electro chemical shutters - shutters using saturable dyes - Peak power emitted during the pulse - Giant pulse dynamics - Laser amplifiers - Mode locking – Mode pulling - Hole burning.

UNIT - IV LASER SPECTROSCOPY

Rayleigh and Raman spectroscopy - Stimulated Raman effect - Coherent Anti stokes Raman scattering (CARS) - Photo Acoustic Raman Spectroscopy - Doppler free two photon Spectroscopy - Brillouin Scattering.

UNIT - V APPLICATIONS OF LASERS

Industrial Applications - hole drilling-cutting - laser welding - Science and Technology - lasers in nuclear science - counting of atoms - Light Detection and Ranging (LIDAR) - Measurement of velocity- Lasers for inspection of products - Holography.

TEXT BOOKS :

1. Laud.B.B, 2011, Lasers and Non-Linear Optics, Third Edition, New Age International Publishers

2. Nambiar. K.R, 2005, LASERS Principles, Types and Applications, 1st Edition, New Age International Publishers.

REFERENCE BOOKS :

3. William T. Silfvast. 1998, Laser Fundamentals, 1st Edition, Cambridge University Press.

4. Svelto.O, 2010, Principles of Lasers, 5th Edition, Springer.

EXTRA CREDIT COURSE -5
ASTROPHYSICS
(COURSE CODE : 23UPHEC5)

COURSE OUTCOMES : At the end of the course the students will be able to

CO1. To know about the universe and space technology
CO2. To understand the concepts of astronomy
CO3. To know the functions of telescopes in weather and their applications
CO4. To analyse the physical properties of sun and its behaviour
CO5. To correlate the concepts and relations

UNIT - I

Birth of Modern Astronomy – Geocentric and Heliocentric theories – Kepler's laws of planetary motion - Planets – Terrestrial and Jovian planets – Asteroids - Meteorites – Comets.

UNIT – II

Telescopes – Elements of telescope – Properties of images – Types of Optical telescopes – Refracting and Reflecting telescopes - Radio telescope Spectrograph.

UNIT - III

Sun – Physical properties – Composition – Core – Nuclear Reactions – Photosphere – Chromosphere – Corona – Sunspots – Sunspot cycle – Solar Wind – Auroras .

UNIT - IV

Classification of Stars – The Harvard Classification system – Luminosity of a Star –Theoretical evolution of stars – White Dwarfs – Neutron stars - Black holes.

UNIT - V

Galaxy nomenclature – Types of Galaxies – Spiral – Elliptical – Irregular galaxies – Milky Way Galaxy and its structure –Star clusters – Galactic clusters.

BOOKS FOR STUDY:

1. Niclolas. A. Pananides and Thomas Arny, 1979, Introductory Astronomy, Addison Wesley Publ. Co.
2. A. Mujiber Rahman, Concepts to Astrophysics, scitech Publications, Chennai.

REFERENCE BOOKS:

1. Abell, Morrison and Wolf, 1987, Exploration of the Universe, 5th Edn., Saunders College Publ.
3. Carol and Ostlie, 2007, Introduction to Modern Astrophysics, 2nd Edn., Pearson International.
3. William J. Kaufmann, III, 1977, Macmillan Publishing company, London.
4. Abhyankar, K.D., Universities Press.

EXTRA CREDIT COURSE - 6
RENEWABLE ENERGY SOURCES
(COURSE CODE : 23UPHEC6)

COURSE OUTCOMES : At the end of the course the students will be able to

CO1 : Get knowledge about the Sun as a source of energy (K2)
CO2 : Study about solar thermal and photovoltaic devices (K1)
CO3 : Understand the basic concepts of Wind, Bio-mass and Geothermal energy sources (K4)
CO4 : Identify the various forms of energy utilization concepts (K1)
CO5 : Analyse the advantages and disadvantages of various forms of energy. (K4)

UNIT - I
INTRODUCTION TO ENERGY SOURCES : Energy consumption as a measure of prosperity – world energy future – energy sources and their availability – conventional energy sources – non-conventional and renewable energy sources – comparison – merits and demerits.

UNIT - II
SOLAR ENERGY : Solar energy Introduction – solar constant – solar radiation at the Earth's surface – solar radiation geometry – Solar radiation measurements – solar radiation data – solar energy storage and storage systems – solar pond – solar cooker – solar water heater – solar greenhouse – types of greenhouses – solar cells.

UNIT - III
WIND ENERGY : Introduction – nature of the wind – basic principle of wind energy conversion – wind energy data and energy estimation – basic components of Wind Energy Conversion Systems (WECS) – advantages and disadvantages of WECS – applications – tidal energy

UNIT - IV
BIOMASS ENERGY : Introduction – classification – biomass conversion technologies – photosynthesis – fermentation – biogas generation –classification of biogas plants – anaerobic digestion for biogas – wood gasification – advantages & disadvantages.

UNIT - V
ENERGY STORAGE : Importance of energy storage - batteries - lead acid battery –nickel - cadmium battery – fuel cells – types of fuel cells – advantages and disadvantages of fuel cells – applications of fuel cells - hydrogen storage.

BOOKS FOR STUDY:

1. G.D.Rai, Non-Conventional Sources of Energy, Khanna Publishers, 2009, 4th Edn.
2. S P Sukhstme, J K Nayak, Solar Energy, Principles of Thermal Collection and Storage, McGraw Hill, 2008, 3rd Edn.
3. D P Kothari, K P Singal, RakeshRajan, PHI Learning Pvt Ltd, 2011, 2nd Edn.

REFERENCE BOOKS:

1. John Twidell& Tony Weir, Renewable Energy Resources, Taylor & Amp; Francis, 2005, 2nd Edn.
2. S.A. Abbasi and NasemaAbbasi, Renewable Energy sources and their environmental impact, PHI Learning Pvt. Ltd, 2008.
3. M. P. Agarwal, Solar Energy, S. Chand & Co. Ltd., New Delhi,1982
4. H. C. Jain, Non-Conventional Sources of Energy, Sterling Publishers,1986.

VALUE ADDED COURSE - 1
BIOMEDICAL INSTRUMENTATION
(COURSE CODE : 23UPHVA1)

COURSE OUTCOMES: At the end of the course the students will be able to

CO1 : Understand the physics on the human body. (K2)

CO2 : Analyse the fundamental concepts, functioning, applications of physiological devices and the importance of clinical and operation theatre equipment. (K4)

CO3 : Validating the knowledge of telemetry system, protection, and modern technologies used in the biomedical instrumentation. (K5)

UNIT - I PHYSICS OF HUMAN BODY

Cell structure - muscular system - cardiovascular system - Forces in and on the body-Medical effects of gravitation forces- pressure in the body - BMR basal metabolic rate –BMI body mass index- neurons - action potentials - passive and active electrical properties

UNIT - II BIOELECTRIC SIGNAL RECORDING

Electrod Cardiography (ECG) – Electro Encephalograph (EEG) - Electro Myograph (EMG)- Electro Oculogram (EOG)

UNIT – III PHYSIOLOGICAL ASSIST DEVICES

Cardiac pacemakers - natural and artificial pacemakers - defibrillator - Various types of oxygenators - kidney machine – hemodialysing units .

UNIT – IV BASIC MEDICAL INSTRUMENTS

Thermometer, stethoscope and sphygmomanometer, pH meters – Audiometer – Endoscopes – ventilators – microwave diathermy techniques

UNIT - V ADVANCES IN BIOMEDICAL INSTRUMENTATION:

X-rays in medicine, Lasers in medicine, Endoscopes, Nuclear imaging techniques, Computer tomography, Ultrasonic imaging systems, Magnetic resonance imaging, angiography.

BOOKS FOR STUDY:

1. M. Arumugam, Biomedical Instrumentation, Anuradha Publishing Co., Kumbakkonam, Tamilnadu, 2004.
2. Jacobson and Webster, Medicine and clinical Engineering, Prentice Hall of India, New Delhi, 1979.

REFERENCE BOOKS:

1. R. S. Khandpur, Handbook of Biomedical Instrumentation, Tata McGraw Hill, New Delhi, 1990.
2. Richad Aston, Principles of Biomedical Instrumentation and measurement, Merrill Publishing Co., London, 1990.
3. Marvin D. Weiss, Biomedical instrumentation, Chilton Book Co., 1973
4. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and Measurements, Prentice-Hall, 1980

VALUE ADDED COURSE - 2
BASIC ELECTRICAL AND ELECTRONICS CIRCUIT

COURSE CODE: 23UPHVA2

COURSE OUTCOMES : At the end of the course the students will be able to

CO1: Understand the working of electronic devices.
CO2 : apply these techniques in practical circuits
CO3 : Develop the skill in handling instruments
CO4 : Understand the various characteristics pertaining to diodes and its applications
CO5 : Understand the various biasing techniques.

UNIT - I ELECTRONIC COMPONENTS (6 Hours)

Introduction – Passive components – Transformer – Working principle – application – Active devices: Diode – Transistor – Analog IC and Digital ICs – Logic gates.

UNIT - II EQUIPMENTS FOR SERVICING (6 Hours)

Soldering Iron – Flux – lead – Zero defect soldering – Desoldering pump – soldering station – Basics of Multimeter – Measurement of current, voltage and resistance using multimeter – Checking transistors and diodes.

UNIT - III HEATING APPLIANCES (6 Hours)

Heater types – working principle – Heating Rod – Iron Box – Iron box with steamer –Microwave Ovens –Disassembling and assembling procedure – Fault indicator – Testing and Troubleshooting methods.

UNIT – IV MOTORISED APPLIANCES (6 Hours)

Types of Motors – DC and AC motor – Fans – mixers – wet grinders – circuit connection - testing methods. Washing machine – Electrical connections – assembly – Electrical connection – Testing and Troubleshooting methods.

UNIT - V REFRIGERATION APPLIANCES (6 Hours)

Fridge – Electrical connection – Compressor – coolants – Automatic defrost circuits – Testing and troubleshooting of refrigerators – Air coolers and Air conditioners – Mounting and fixing of Air Conditioners – testing and troubleshooting methods.

BOOKS FOR STUDY:

1. Eric Kleinert, Troubleshooting and Repairing major appliances, McGraw Hill Professional, 3rd Edition, 2012.
2. Sawhney A.K., "A course in Electrical and Electronic Measurements and Instrumentation",Dhanpati Rai & Sons, 11th Edition, 1995.

ADD ON COURSE - 1
DOMESTIC ELECTRICAL WIRING
(COURSE CODE : 23UPHAO1)

COURSE OUTCOMES : At the end of this course, a student will be able to

CO1 : Acquire necessary knowledge on performance of various energy meters, switches, Protective devices
CO2 : Understand the working principle of electrical instruments
CO3 : Check the electrical connections and acquire skills/hand on experience and working knowledge with house-hold electrical appliances
CO4 : Train the students for Troubleshooting wiring faults
CO5 : Apply the basic practical knowledge and skills of the students on electrical circuit testing, repairing household electrical appliances.

UNIT - I Introduction to Electricity

Electric charge, voltage, Electric current, Ohm's law, electric potential, cell, Serial and Parallel circuit, AC and DC voltage and current - Transformer, Electricity generation, transmission and distribution: Power stations- Soldering wires - Multimeter Operations.

UNIT - II Electric Switches and Energy Meters

Various types of switches – Methods of fixing Single Phase and Three Phase Energy meters.

UNIT – III House Electrical Wiring

Various types of wires for house wiring – different types of electric meters and instruments - Types of Wiring – casing, capping- single pole single throw, single pole double throw, double pole single throw and double pole double throw switches – staircase switches – tube light – ceiling fan – water heater- iron box connections.

UNIT - IV Electricity Bill

Power rating of household appliances including air conditioners, PCs, laptops, printers etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

UNIT - V Protective Devices and Security Procedure

Fuses and circuit breakers – MCB - Purpose and methods of Earthing - Reporting accidents, system failures, power failures, protection equipment, First aid requirement in case of electric shocks and other injuries.

BOOKS FOR STUDY :

1. A Text book of Electrical Technology, B.L. Theraja, S. Chand & Co.,
2. Domestic Appliances Servicing, K.P. Answer, Scholar Institute Publications
3. Electricity and Magnetism, R. Murugeshan ABC of elecrical engineering A. K. Theraja

REFERENCES :

1. Inspection by Bob. Entry of Electrical System. http://www.inspectionsbybob.com/vocab-electrical/
2. The Philippine Electrical Code. http://dsf.edu.ph/wp-content/uploads/2017/04/Philippine-
3. Electrical-Code.pdfArctoolbox. Electrical Power Systems in Buildings. https://www.archtoolbox.com/materials-systems/electrical/electrical-power-systems.html
4. OEM Panels. 3 Phase Power vs. Single Phase Power. http://www.oempanels.com/what-does-single-and-three-phase-power-mean
5. UK Power Networks. http://www.ukpowernetworks.co.uk/internet/en/help-and-advice/need-help/single-three-phase-difference.html
6. Electrical Technology. Earthing and Electrical Grounding Installation | A Complete Guide. https://www.electricaltechnology.org/2015/05/earthing-and-electrical-grounding-types-of-earthing.html

ADD ON COURSE - 2
PHYSICS FOR BEGINNERS
(COURSE CODE: 23 UPHA 02)

COURSE OUTCOMES: At the end of the course, the student will be able to

CO1 : Remember the basics of Physics in wide range of areas

CO2 : Understand the basic physics concepts behind every day activities of human life and understand characteristics of solar radiation and solar energy devices.

CO3 : Apply innovation ideas in our routine works using basic physics principles

CO4 : Create the awareness of scientific principles to the non-science audience.

CO5 : Evaluate the merits and demerits of nuclear reactors and nuclear weapons.

UNIT – I : Energy, Forces and Motion

Energy, Energy and food, Energy stores, Energy transfers, Renewable energy sources, Non–renewable energy sources, Climate change. Force, Types of forces, Balanced and unbalanced forces, Resultant forces, Circular motion, centripetal force, Newton's second law – force, mass and acceleration, Momentum.

UNIT – II : Sound and Light Waves

Waves, Sounds waves, Longitudial and transverse waves, Wave equation, SONAR, Comparing Light and Sound waves, Reflection, Refraction and Interference, Refractive index, Light and Color

UNIT – III : Electricity and Magnetism

Current Electricity, Conductors and insulators, Measuring voltage, current and resistance, Series and parallel circuit rules, Direct and alternating current. Magnets, Magnetic fields Electromagnets, Electromagnetic induction, Dynamos.

UNIT – IV : States of Matter and Atoms

States of matter, solids, liquids and gases, Changes of state, Heat expansion, Density, Specific heat capacity, Pressure, Volume and Temperature, Atomic Structure, Radioactive decay, Different types of radiations, Nuclear medicine, Fission and Fusion.

UNIT – V : Space

Structure of Earth, Inside the Earth, Seasons, Sun's path, Solar system, The Moon, Eclipses, Orbits, Shapes of orbits, Types of orbits, Galaxies.

BOOKS FOR STUDY :

1. Super Simple Physics – The ultimate bite size study guide, DK Smithsonian,
2. How Things Work: The Physics of Everyday Life by Louis A.Bloomfield, Wiley publications, 5th Edition
3. University Physics by F. W. Sears, M. Zemansky, R. A. Freedman, and H. D. Young, PearsonEducation
4. Fundamentals of Physics by D. Halliday, R. Resnick, J. Walker, John Wiley & Sons

ALLIED PHYSICS – 1 PRACTICAL (FOR MATHEMATICS)
(COURSE CODE : 23UPHE12)

SEMESTER – I	EC -P1	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Young's modulus - Uniform bending - Telescope
2. Young's modulus - Non-uniform bending - Pin & Microscope
3. Coefficient of Viscosity - Constant pressure head method
4. Surface Tension - Drop weight method
5. Acceleration due to gravity - Compound pendulum
6. Conductivity of bad conductor - Lee's disc method
7. Newton's law of cooling - Verification
8. Specific heat capacity of a liquid - Newton's law of cooling
9. Torsional Pendulum - Determination of rigidity modulus

ALLIED PHYSICS – II (PRACTICALS)
(SUB CODE : 23UPHE22)

SEMESTER – II	EC– P2	HOURS – 2	CREDITS – 3	TOTAL HOURS : 30

1. Grating - Oblique incidence
2. Air wedge - Thickness of wire
3. LCR Series resonance
4. LCR Parallel resonance
5. Newton's rings
6. Zener diode characteristics
7. Diode rectifier
8. Spectrometer grating normal incidence method
9. Spectrometer – Prism - determination of refractive index of glass
10. Focal length of convex lenses in contact and out of contact

ALLIED PHYSICS – I
(II B.SC., CHEMISTRY)
(COURSE CODE : 23UPHE31)

SEMESTER - III	EC – T3	HOURS – 4	CREDITS – 3	TOTAL HOURS : 60

OBJECTIVES :

To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

COURSE OUTCOMES : At the end of the course, the student will be able to

CO1 : Students studying allied physics can able to know, various modulus involved in the materials, flow of liquids due to viscous forces, transmission of heat due to process of conduction, convection and radiation (K1)

CO2 : Study the various laws involved in heat transformation (K1)

CO3 : Classify the various thermodynamic laws and the concept of entropy (K4)

CO4 : Understand the phenomenon like interference and diffraction (K2)

CO5 : Reflecting the optical activity of liquids and its uses. (K5)

UNIT - I : **Elasticity** **(12 Hours)**

Elasticity - Bending of beams - Expression for bending moment - Uniform bending - Theory - Twisting couple on a cylindrical wire - Expression for a couple per unit twist - Work done - Torsional pendulum - Experiment to determine rigidity modulus of the wire using torsional pendulum - Acceleration due to gravity - Compound pendulum - Theory and experiment.

UNIT - II : **Surface Tension** **(12 Hours)**

Surface tension - Excess of pressure over curved surface - Drop weight method - Coefficient of viscosity and its dimension - Stokes formula for viscous drag - Experiment to determine the coefficient of a highly viscous liquid - Flow of a liquid through a uniform capillary tube - Method of dimensions - Poiseuilles method.

UNIT - III : **Specific Heat Capacity** **(12 Hours)**

Specific heat capacity - Callendar and Barnes continous flow method - Variation of specific heat capacity of solids with temperature - Variation of atomic heat of solids with temperature - Theory of specific heat - Einstein theory - Debye's theory.

UNIT- 4 : **Thermal Conductivity** **(12 Hours)**

Lees disc experiment to determine the thermal conductivity of a bad conductor (cardboard only) - Analogy between heat flow and electric current - Weidemann - Franz law - Newtons law of cooling - Experimental verification - Experiment to determine the specific heat capacity of a liquid - Concept of pressure, volume and temperature of a gas - Mean free path - Expression for mean free path, viscosity, thermal conductivity.

UNIT - 5: **Conventional Energy** **(12 Hours)**

Conventional energy sources - coal,oil and natural gas - Energy released in a nuclear fission and fusion - Nuclear reactor - Non conventional energy sources - Wind energy - Tidal energy - Wave energy - Photo voltaic effect - Solar cell - Solar ponds.

TEXTBOOKS:

1. A.Ubald Raj & G. Jose Robin - Properties of Matter and Optics, Indira Publications, 1- Edition.
2. A.Ubald Raj & G. Jose Robin - Allied physics, vol.2 (Thermal Physics and Sound) Indira Publications, 1- Edition.

REFERENCE BOOKS:

1. N.Sundararajan, George Thomas, Syed Azeez - College Physics Vol 1, United Publishers, 1- Edition.
2. A.Ubald Raj & G. Jose Robin – Oscillations, Properties of Matter and Energy Physics and Optics and Spectroscopy - Indira Publications, 1- Edition.
3. Brijlal - Heat and Thermodynamics and Statistical Physics, S.Chand & Company – 2010.
4. R.Murugesan - Properties of Matter S. Chand and Company - 2010

II B.SC. CHEMISTRY
ALLIED PHYSICS – I (PRACTICALS)
(COURSE CODE : 23 UPHE32)

SEMESTER – III	EC –P3	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Young's modulus - Uniform bending - Telescope
2. Young's modulus - Non-uniform bending - Pin & Microscope
3. Coefficient of Viscosity - Constant pressure head method
4. Surface Tension - Drop weight method
5. Acceleration due to gravity - Compound pendulum
6. Conductivity of bad conductor - Lee's disc method
7. Newton's law of cooling - verification
8. Specific heat capacity of a liquid - Newton's law of cooling
9. Torsional Pendulum - Determination of rigidity modulus

II B.SC CHEMISTRY
ALLIED PHYSICS – II
(COURSE CODE : 23 UPHE41)

SEMESTER – IV	EC– T4	HOURS – 3	CREDITS – 3	TOTAL HOURS : 45

COURSE OUTCOMES :

CO1 : Makes the learner understand the basic principles of electricity. (K2)
CO2 : Understand the applications of optics in everyday life. (K2)
CO3 : Inculcate the knowledge in electronics circuits. (K6)
CO4: To retrive the basic concepts of relativity. (K1)
CO5: To impliment the principles amplifiers and oscillators. (K3)

UNIT - I **(9 Hours)**

Coulomb's law – electric field – electric field due to a point charge – electric dipole – electric flux – Gauss law – applications – electric field due to a charged conducting sphere (point inside and outside) – uniformly charged cylinder (line charge) – electric potential – potential difference – relation connecting electric field and electric potential at a point – equipotential surface.

UNIT - II **(9 Hours)**

Self induction of a coil – calculation of self inductance of a long solenoid – alternating current – phase difference between current and voltage in alternating circuits with resistance only, capacitance only and inductance only – LR circuit – LCR series resonance circuit – LCR parallel resonance circuit(characteristics only).

UNIT - III **(9 Hours)**

Junction diode – biasing – pn diode equation – V-I characteristics – Zener diode – V-I characteristics applications – Junction transistor – voltage- divider biasing – transistor amplifier – CE configuration – feedback principle - Barchausan criterion for oscillations.

UNIT - IV **(9 Hours)**

Interference – air wedge – Newton's rings – diffraction – experiment to determine the wavelength of monochromatic light using plane transmission grating - polarization – double refraction

UNIT - V **(9 Hours)**

Frame of reference – Galilean transformation – special theory of relativity – Lorentz transformation equation – velocity transformation equations - relativistic velocity addition – length contraction – time dilation – variation of mass with velocity – Einstein's mass energy relation.

TEXT BOOK :

1. A. Ubald Raj and G. Jose Robin – Allied Physics Vol.I – Indra, Publication 1st Edition.

REFERENCE BOOKS :

1. N. Sundararajan, George Thomas and Syed Azeez – College Physics Vol. II, United Publishers, 1st Edition 2009.
2. N. Sundararajan, George Thomas and Syed Azeez – College Physics Vol. III, United Publishers, 1st Edition 2009.
3. A. Ubald Raj and G. Jose Robin – Relativity, Wave Mechanics and Nuclear Physics, Indra Publication 1st Edition 2009.
4. N.Subramanyam , Brijlal and M.N.Avadhanulu – A text book of optics – S.Chand & Company Ltd., 23rd Edition 2006.

II B.SC. CHEMISTRY

ALLIED PHYSICS – II (PRACTICALS)
(COURSE CODE : 23UPHE42)

SEMESTER – IV	EC– P4	HOURS – 2	CREDITS – 2	TOTAL HOURS : 30

1. Grating - Oblique incidence
2. Air wedge - Thickness of wire
3. LCR series resonance
4. LCR parallel resonance
5. Newton's rings
6. Zener diode characteristics
7. Diode rectifier
8. Spectrometer grating normal incidence method
9. spectrometer – prism - determination of refractive index of glass
10. Focal length of convex lenses in contact and out of contact